APPENDIX B
ECONOMIC ANALYSIS

ECONOMIC SUMMARY

A preliminary economic study in 1998 identified that further evaluation of improvements to the existing harbor at Port Lions, Alaska, was appropriate. This economic analysis appendix presents a more robust advanced stage economic analysis that evaluates alternative plans of improvement and shows how the various plans compare using National Economic Development (NED) criteria as presented in Corps guidance, primarily ER1105-2-100. This analysis also identifies the NED Plan, and demonstrates economic justification of the recommended action.

The harbor was originally constructed in 1983 to accommodate 124[1] vessels but can now only accommodate 35 year around vessels because the harbor is subject to periodic storm related rough water conditions that cause damage to vessels moored in the harbor and harbor facilities. The periodic damages are frequent and serious. The storm events disrupt harbor use, and on many occasions, cause evacuation of some vessels and a need for emergency tie off of others. Since construction, the harbor has earned a reputation as a dangerous moorage, which has discouraged commercial fishers operating in the general area from using the harbor despite a regional year-around shortage of suitable moorage. Port Lions has an ideal location, relative to the favored fishing grounds, however, it remains seriously underutilized even at the peak of the summer season when all other harbors are filled to capacity. The reason for this lack of use is the dangerous conditions that can develop with little warning inside the harbor. Except for 35 moorage spaces, which enjoy some protection by the existing breakwater, the large fleet of commercial fishers intentionally avoids the harbor even though its proximity to the fishing grounds offers a significant reduction in vessel travel cost.

For Port Lions and the general Kodiak Island area, demand for year around moorage exceeds all known approved supply projections. A shortage of safe and convenient moorage continues to drive up the harvest cost for commercial fishers because of the greater travel distance to available moorages. Vessel damage is also higher because some fishers are forced to anchor out, raft with others, or ride out storms at unprotected locations.

The Port Lions small boat harbor, located on the northeast coast of Kodiak Island at the community of Port Lions, is the heart of the community and its lifeline. The harbor is an important part of the economic fabric of the community in that it provides a transportation link for the community, which is not accessible by road; and it serves as the only moorage for the local fishing fleet. If the harbor continues to deteriorate, that part of the local population who rely on fish harvesting, sport charter fishing, or adventure guiding might be forced out of business or be compelled by economic circumstances to move to locations where vessels can be safely moored.

Local vessels serve as the community's basic transportation system when wave conditions within the harbor are mild enough. Therefore the harbor is especially valuable in its contribution to the safety, well being, and general economic welfare of local residents during the many days each year when regional air charters cannot provide service to the nearby

[1] Port Lions Small Boat Harbor Breakwater Repair, Letter Report No. 1, Alaska District Corps of Engineers, 25 June 1982.

gravel landing strip because of fog, wind, and icing weather conditions. The harbor serves as a low cost alternative to air travel, being less than half the cost. The harbor is also at an ideal location to provide a low cost base of operations for the commercial fishing fleet.

This report quantifies preventable economic losses caused by conditions at Port Lions. By calculating a high range and low range of vessel operating costs, as they would be with harbor deficiencies removed, the report compares these operating costs against a baseline under the without-project condition. This comparison produces a range of net income gains or benefits under the presumption that the project deficiencies will be removed. In addition to the net income effects on the commercial fishing fleet, there are also other direct benefits derived from the presence of a safe haven; and other benefits result from systematic improvements to subsistence gathering activities and from avoided cost of harbor maintenance.

Benefits are evaluated for three different size harbors with consideration of various design preferences. Design variations include incorporation of floating breakwater components and variations in breakwater configuration. The three harbor size variations for the selected design range in total annual cost from $610,000 to $633,000 including operations and maintenance. The best plan in terms of economic criteria has a total annual cost of $610,000 and annual benefits of $884,000, yielding a benefit to cost ratio of 1.5:1 and net annual benefits of $274,000.

This Economic Appendix is structured to first discuss the economy and resource conditions of the greater Kodiak Island area. The appendix then discusses the harbor facilities that are considered to be alternatives to the proposed navigation improvements at Port Lions. The appendix accounts for the regional fleet and demonstrates the economic advantages that the fleet will enjoy by working out of the Port Lions location while identifying the otherwise unmet demand for moorage that would be accommodated at Port Lions in the with-project condition. The net income advantage, created by the Port Lions navigation improvements, is accounted for by comparing commercial fishing operating costs for a typical season, while operating out of Port Lions, with operations out of the least cost alternative.

Problem Statement. The major problem identified at the reconnaissance stage was that the existing harbor is subject to periodic storm related rough water conditions that damage vessels and harbor facilities and limit the usefulness of the harbor for commercial vessels operating in the vicinity. The wave related problems discourages use of the harbor even at seasons of fair weather when the harbor would ordinarily be expected to provide peak occupancy. The wave related problems are obvious to the users, and the harbor has a reputation as an undesirable high-risk moorage.

For the general Kodiak Island area, demand for year around moorage exceeds all future increased moorage that could be provided through all known approved expansion plans. A shortage of regional moorage that is both safe and convenient has led to lost income, vessel damages, lost time, and inconvenience. In the Kodiak Island area, there is a demand for additional moorage for more than 301 vessels of all sizes at peak use periods and 102 at low use periods. At the city of Kodiak alone, as of early 2002, – there were 72 vessels on the waiting list for new or improved moorage in the city harbor.

CONTENTS

TABLES

1.0 OVERVIEW OF THE REGION AND COMMUNITY

1.1 Socioeconomic Environment of Kodiak Island

Kodiak Island is 252 air miles south of Anchorage and can be reached from Anchorage with a 45-minute flight; it is a 4-hour flight from Seattle. Kodiak Island is the largest island in Alaska, and is second only in size to Hawaii in the U.S.

The city of Kodiak with 6,334 residents in 2000 is the main population center of the island. Alaska Natives represent 13.1% of the population of 6,334, and a federally recognized tribe is located in the community. The Coast Guard comprises a significant portion of the community, and there is a large seasonal population (canneries) of Filipinos. A Russian Orthodox seminary is located in Kodiak — one of two existing seminaries in the U.S.

The State-owned Kodiak Airport provides a 7,500-ft paved runway and Kodiak Municipal Airport offers a 2,475-ft paved runway. Three scheduled airlines serve Kodiak Island with several daily flights, and a number of air taxi services provide flights to other communities on the Island. City-owned seaplane bases at Trident Basin and Lilly Lake serve floatplane traffic.

The Alaska Marine Highway System operates a ferry service to and from Seward and Homer. In addition to two boat harbors, the Port of Kodiak includes three commercial piers including the ferry dock, city dock, and container terminal. Boat launch ramps and vessel haul-outs are available. The city harbor complex is advertised as being able to accommodate 650 commercial and recreational/subsistence vessels, and Kodiak Island overall accommodates 777.

Kodiak National Wildlife Refuge encompasses nearly 1.9 million acres on Kodiak and adjacent Afognak Islands (popular hunting and fishing destinations). In addition to tourism, the Kodiak economy is based on fishing, seafood processing, retail services, and government. Adaptability and diversification in a variety of fisheries has enabled the Kodiak economy to develop and stabilize. In recent years Kodiak has established itself as the nation's third highest port in seafood volume and value, for example in 1998 having 358 million lbs. of seafood landed at a value of $79.7 million. In 2000, Kodiak landed $94.7 million in seafood and in 2001 Kodiak was still in third place with $74.4 million after Dutch Harbor AK and New Bedford MA[2]. Over the last decade the value of fish landed at Kodiak has not varied a great deal around the annual average of $90 million (see table 1).

There are 649 area residents that hold commercial fishing permits, and up to thirteen fish processing companies operate year-round. The largest processors operating during recent years include International Seafoods, Trident, Ocean Beauty, North Pacific, and Cook Inlet Processors. The hospital and City also rank among the top employers. The nation’s largest U.S. Coast Guard station lies just south of the city. A 27-acre low-earth orbit launch complex, Kodiak Launch Facility, is located 25 miles southwest of Kodiak at Cape Narrow. The $38-million facility launched its first payload in October 1998.

---

[2] Website access to NOAA database, http://www.st.nmfs.gov/st1/market_news/leading_ports01.pdf

Table 1. Kodiak Landings

Year	Value ($ millions)	Pounds (millions)	National Rank (value/lbs)
2001	74.4	285.5	3/5
2000	94.7	289.6	3/5
1999	100.8	331.6	3/5
1998	78.7	357.6	3/5
1997	88.6	277.5	3/6
1996	82.3	202.7	3/5
1995	105.4	362.4	2/2
1994	107.6	307.7	2/2
1993	81.5	374.2	3/2
1992	90.0	274.0	3/3

1.2 Marine Resource Management in the Kodiak Island Area

1.2.1 Marine Resource Management in the Kodiak Island Area

The Kodiak Management Area (KMA) generally encompasses all coastal waters and inland drainage entering the waters surrounding the island. The KMA is regulated by a set of complex rules and emergency orders for specific management areas, which specify allowable harvest times and practices for various species. Management areas are in turn broken down with smaller statistical areas for purposes of regulation and record keeping.

Since there are a multitude of different types of fisheries in the KMA, there are various combinations of vessel and gear types including those best suited to operate efficiently within the rules for specific fisheries or combinations of fisheries. The commercial fishing fleet most directly related to this report is made up of the type of vessels that harvest salmon from early June through September and they are ordinarily described as seiners and gill netters.

Operations of the salmon fleet are highly controlled through fishing regulations, which are very complex and change frequently on short notice. For example, there might be 40 or more, emergency regulatory orders for salmon harvest in an area during a single season. Each of the emergency orders can be a complex set of short notice instructions and typically could apply differently to several species, while also differentiating among the 90 statistical areas adjacent to Kodiak Island.

1.2.2 Kodiak Area Marine Resources

The Kodiak area hosts many marine resources, and many are in sufficient abundance to be commercially harvested. Commercially harvested resources include five species of salmon, halibut, black cod, pacific cod, shrimp, and numerous species of crab, including tanner, Dungeness, and varieties of king crab. Other resources include bottom fish such as lingcod, rockfish, flounder, and sole. The following discussion is centered on resources, which are directly related to harbor activity at Port Lions, and which serve as basic income to a fleet at the harbor:

Salmon. There are approximately 800 anadromous streams within the KMA in which salmon migration or spawning has been documented. Of these, 440 streams have significant salmon production. A sustainable average production has been calculated for the KMA at

approximately 37,500 Chinook, 5,250,000 sockeye, 375,000 coho, 10,500,000 to 15,750,000 pink, and 2,856,000 chum salmon. Escapement goals are set for Kodiak streams, and commercial fisheries are managed to allow harvest of salmon production surplus, over and above escapement needs. There are no quotas.

There are two hatcheries located in the KMA, their objective being to produce and maintain an increase in the harvest of salmon (over and above the KMA wild salmon harvest) by an additional 3,000 Chinook, 1,700,000 sockeye, 383,000 coho, 11,500,000 pink, and 1,100,000 chum salmon after the year 2002. Both hatcheries are state owned and are operated by contractors. The Pillar Creek hatchery produces sockeye, coho, and Chinook. The Kitoi Bay hatchery produces pink, chum, coho, and sockeye. In 1999, the two hatcheries produced over 141 million fingerlings, about 10% of the total number of salmon produced by the state's 34 operating hatcheries. Hatchery produced salmon made up 34% of the statewide harvest in 2000, measured in numbers of fish, and 22% measured by total value of the take. For Kodiak Island, hatchery produced salmon accounted for 31% of the year 2000 actual harvest of 14.4 million fish. The harvest for 2002 was 21.3 million fish.

The State hatchery program has matured, and stabilized production levels are anticipated into the future. The average yearly harvest, during the decade of the 90's, was 2.6 times that of the average yearly harvest during the decade of the 70's. The main concerns in the industry are not the salmon stocks but rather the abundant harvests that tend to drive prices down, and the price competition of primarily imported farmed fish. However lately, there has been a rash of fish farm closures due to their inability to meet industry and customer expectations[3].

Lower prices for Alaska fishers have encouraged the industry to explore ways to make the harvesting sector more viable. From within the industry, under the leadership of the United Fishermen of Alaska, a number of initiatives are developing from every conceivable angle. They include seeking harvesting efficiency, exploiting marketing opportunities, improving and expanding industrial relations, fisheries management options for maximizing quality, seeking statutory and regulatory changes, and more.

A main theme is the ongoing major effort to emphasize product quality so that the final product includes characteristics not available in farmed fish thereby giving it the trappings of a unique food product and a special appeal to a consumer niche in search of quality instead of price. Uniqueness of taste and appearance is already present, and effectively advertising it will separate Alaska wild salmon from imported farmed fish and encourage a separate price structure for the two non-substitutable products.

There are numerous marketing initiatives taking place to combat the eroding profit margins facing the industry. This narrowing of margins has a long history leading to fleet adjustments, which have been taking place gradually over time indicating that any sudden concentration of permits among fewer vessels is very unlikely. It is unlikely that any new trend in restructuring of the fleet will take place in any significant way partly because adjustments caused by eroding profit margins over a decade have tended to balance things

---

[3] Of 40 Chilean salmon farms 15 went bankrupt or closed for other reasons during 2001 causing a projected 48% production cutback in 2002-2003, see Pacific Fishing February 2003, Japan Update, Bill Atkinson accessible at Pacificfishing.com

out. For example, the number of vessels in Alaska limited entry fisheries has gradually declined from 17,378 in 1990 to 14,243 in 2002; a reduction of 18%.

Communities are taking the position that larger fleets are better for their local economies because they stimulate economic activity by creating jobs in the support sector. Some observers argue that Alaska already has a working limited entry program and that the industry has reached an economic optimum because of equilibrium market forces. They also point to State law that requires the limited entry program to maintain an optimum fleet[4]. Others argue that the limited entry program is unconstitutional and have filed law suites on those grounds. In either case market forces will continue to determine prices, profitability, and equilibrium fleet size.

In 2003, the office of the Governor implemented a $50 million fishery revitalization strategy aimed at providing relief to the industry by bettering its competitive situation. It emphasizes new marketing initiatives to increase sales and prices while increasing harvest efficiency and product quality through improvement of the transportation infrastructure.

In the meantime, significant changes in the ways fishers operate are taking place because of the pressure on profitability of salmon fishing. It has become common for former salmon fishers to become fishers in a multi-species operation thus expanding earning opportunities by harvesting other species to make up for lower salmon prices. This change in harvest strategy is reflected in the physical appearance of the fleet which now includes numerous multi use vessels that can be quickly converted to seiner, pot fisher, long liner, and in some cases to mini-trawler.

One fundamental structural change in the way salmon fishers compete and cooperate with each other is being conducted as an experiment outside of the KMA. It stems from a recent interest in fishing cooperatives in which the fishers select from among the member pool of vessels permitted to fish in a particular area, a number adequate to harvest the entire allowable take. This harvest is done while the other vessels, which would otherwise compete for a share of the harvest, go to work as charter boats or target other fisheries such as cod, halibut, or sablefish. In some cases an operator might elect to remain idle for the salmon season.

In the cooperative arrangement the active harvesters cover their costs and share the net income among the pool of vessel owners in the cooperative. In 2002, the state regulatory agencies experimented with a co-op at Chignik, which hired 19 of its 77 members to catch salmon, with the remaining purse seine boats bowing out of the salmon harvest to save expenses. Members shared costs and profits at season's end, and each netted at least $20,000, including those who stayed home. The 19 working boats also each received up to $40,000 extra for their trouble. The new fishing style is controversial, especially among the 23 independent non-member fishermen who complained that the state reserved most of the fish for the co-op. Some independents have sued to break up the co-op and they plan to challenge

---

[4] Alaska presently has a requirement for optimum numbers as stipulated in Alaska Statutes at 16.43.290. There are concerns that a limiting program can cause fisheries to become too exclusive. The State Constitution has also been cited as a basis for elimination of the Limited Entry program. See Alaska Supreme Court in Johns v CFEC.

it at meetings of the state Board of Fisheries. A common complaint is that harvest regulations favor the co-op arrangement and thus deprive non-members of a fair opportunity at harvesting.

In addition to co-ops there are other options for reduction of the cost of salmon harvesting and strategies for increasing fish market values. Some of the public discussions include mention of buy back programs to reduce the number of vessels. Buy back options have been on the table in Alaska for many years although so far nothing has been done in Alaska to implement them as a solution to low prices and eroding profit margins. One argument is that equilibrium economics will force out the less profitable vessels without a buy back program and the fleet size will be self-limiting. Some buyback plans were implemented in Washington, Oregon, and British Columbia in the 1990's.[5]

Language of the constitution of the state of Alaska in Article VIII, Section 15 includes words to the effect, "…No exclusive right or special privilege of fishery shall be created or authorized in the natural waters of the State…" and Article VIII Section 3 says in part, "…Wherever occurring in their natural state, fish, wildlife, and waters are reserved to the people for common use[6]. It appears that a successful effort to tailor the Alaska fleet has constitutional problems in front of it. Such was not the case where buy back programs were implemented elsewhere. Notwithstanding this the fundamental problems addressed by buy back programs elsewhere have been to reduce the number of fishers due to declining stocks which is not the case with Alaska fisheries.

In the case of Oregon, Washington and British Columbia, the urge to buy fishers out stemmed from stock declines and necessary regulatory cut backs in allowable harvest making it impossible for all of the permitted fishers to make ends meet. In the case of Alaska the problem is too many fish contributing to a long-term trend in lower ex vessel prices while stocks remain healthy. The Alaska situation did not develop overnight and history has indicated that it is somewhat self-curing. For several years fishers who feel that they will not be able to make a profit adequate to reward the risk have elected to skip a season now and then. Among permitted salmon harvesters of the last 10 years, on average, only 73% of them actually harvested. Among all permitted fisheries including salmon over the last 10 years the percentage fishing in a given year has fluctuated from 50% to 70%. In addition to this fairly constant percentage of inactive vessels, the number of limited entry vessels registered in the Kodiak Census Area has declined gradually since 1990 by 31%. Clearly the invisible hand of market economics is bringing forces to bear and is effectively optimizing the amount of capital at work in the harvest activity. Under the presumption that management policies will incorporate sound economic reasoning one can conclude, "… Management that is truly efficient will permit a maximum number of users to derive the maximum benefit from a sustainable resource."[7]

---

[5] Outline of Options for Fleet Consolidation in Alaska's Salmon Fisheries, Commercial Fisheries Entry Commission, December 1998 accessible at http://www.cfec.state.ak.us/commishs/fleetcon.pdf

[6] Constitution of the State of Alaska accessible at http://www.gov.state.ak.us/ltgov/akcon/art08.html

[7] National Fisherman, May 2003, Editors Log, Jerry Fraser

Herring - Two herring fisheries occur each year at Kodiak in the spring, purse seine and gillnet, both for sac roe; and a herring food and bait fishery occurs in the fall but not necessarily in every year. All of the herring fisheries are managed for a guideline harvest level and the management objective is to target fisheries on a high quality segment of the biomass.

Sac roe fisheries harvest herring just before spawning using either purse seine or gillnet gear. Herring are transferred from the catcher boats to larger tenders, which deliver them to, Japanese "tramp" freighters. After the herring are transported to Japan, the roe is removed from the females, and their carcasses along with the males, are made into fishmeal. The roe is salted and packaged as a product that sometimes sells for over $100/lb in Japan. In recent years, the Alaska sac roe harvest has averaged about 50,000 tons, almost all of which ends up in the Japanese marketplace.

The commercial catch of herring for bait in Alaska began around 1900 and remained relatively stable, typically 2,000–3,000 tons, in spite of very large fluctuations in the herring catch for the reduction, foreign, and sac roe fisheries. The development of extensive crab fisheries in the 1970s greatly increased the demand for herring bait. Average harvests have been about 8,000 tons in recent years.

Herring bait fisheries usually occur during the fall and winter. Herring fat content is high during the summer, and summer-caught herring do not preserve as well. However, high oil content is desirable for some methods of preserving herring for food. Production of herring food products has been minimal in recent years.

Most herring fisheries in Alaska are regulated by management units or regulatory stocks (i.e., geographically distinct spawning aggregations defined by regulation). Those aggregations may occupy areas as small as several miles of beach. In 2001 there were 47 separate management units in the KMA. Herring sac roe fisheries are always of individual regulatory stocks however the food/bait herring fisheries are in the late summer, fall, and winter when herring from several regulatory stocks may be mixed together.

The Board of Fisheries (BOF) has established a maximum exploitation rate (fraction of the spawning population removed by the fishery) of 20%. Fisheries are closed if stock size falls below the minimum stock size thought necessary to guarantee sustained yield from the stock. Lower exploitation rates are usually used when herring stocks decline to near-threshold levels.

In 1998 at Kodiak, 27 purse seiners and 3 gill net vessels took a herring harvest with an ex-vessel value of $738,000. The year was typical of Kodiak based activities for the past 5 years.

Cod - Prior to 1996, solely the federal government managed pacific cod, a groundfish. At the request of former Governor Knowles, the BOF opened a small fishery during 1996 in a few areas around Kodiak to give small boat fishermen a chance to participate. Then, in November of 1996 the BOF adopted regulations extending the new Pacific cod fishery to other state waters near Kodiak, in Cook Inlet, and Prince William Sound (PWS). Originally area registration was exclusive, and a vessel was allowed only one registration in a year. Legal gear includes pot, mechanical jig, or hand troll/jig but the amount of gear is not controlled.

In 1999, a typical year for pacific cod, the guideline harvest level for Kodiak was 11.7 million lbs. The Kodiak year-around small boat jig fishery took 2.3 million lbs. and the pot fishers landed 8.3 million lbs. leaving over a million lbs. unharvested. Catch rates for jig fishers are relatively low but gear is also a low cost arrangement. Periodic closures generally apply to the larger vessels which are equipped as pot fishers or automatic long liners and this tends to favor smaller boats of the day use fleet which are generally jig fishers with one or two persons fishing. Generally though, the pot and jig cod fishery near Kodiak is open all year.

In waters off shore of Kodiak Island in the Gulf of Alaska Pacific cod is fished by large longline vessels (generally 90 to 200 ft) with automated baiting systems each one capable of baiting up to 50,000 hooks in a day. Pacific cod catch rates are typically low requiring vessels to scale up their operations and take advantage of the latest fishing systems to harvest numbers of pacific cod great enough to amortize the investment. Without the latest automated gear the economics of the large boat fishery present an unsuitable high risk - profitability relationship. None of the off shore longline fleet is relevant to potential improvements at Port Lions because Port Lions cannot accommodate the large vessels and Port Lions is more distant from the Gulf of Alaska fishing grounds than are numerous other ports.

Shellfish - Vessels operating out of Kodiak harbors have commercially harvested numerous varieties of shellfish. However, in recent years a conservative management strategy has been applied and in most recent years there has been no commercial crab harvest at Kodiak. There are 79 shellfish permit holders living at Kodiak but they fish for crab elsewhere. In a “low normal year” such as 2000, the 79 permits earned over $12,200,000. The shellfish harvest is therefore important to the economy of the overall Kodiak area even though the actual taking may happen in distant waters.

2.0 WITHOUT-PROJECT CONDITION AND FLEET PROJECTION

2.1 Port Lions Location and Description

Port Lions is located in Settler Cove, on the northeast coast of Kodiak Island, 247 air miles southwest of Anchorage. Settler Cove lies within Kizhuyak Bay, which opens to the larger Marmot Bay thence to the Gulf of Alaska. The harbor is shown on National Oceanic and Atmospheric Administration chart number 16504, a 1:78,900 Mercator projection.

The displaced inhabitants of Afognak, which was destroyed by tsunami after the Good Friday Earthquake, founded the town of Port Lions in 1964. The community was named in honor of the Lions Club for their support in rebuilding and relocating the village. The City government was incorporated in 1966. For many years, Port Lions was the site of the large Wakefield Cannery however the cannery burned down in March 1975. Soon thereafter, the village corporation purchased a 149-foot floating processor, the Smokwa, which was sold in 1978, but continued to process crab in the area until 1980. A small sawmill, located south of town, operated until 1976. Today most of the non-government jobs are in fishing and tourism.

In the 2000 census, the total population was 256. It was made up of the following groups: Male 136, Female 128; Native 162, and Caucasian 89, for a Male to Female ratio of 1.06:1, and a Native percentage of 63.7%. The most recent population estimate was 256 and was provided by the Alaska Department of Community and Economic Development (DCED) in 2003 and is used as a basis for apportioning State program support.

Port Lions is accessible by air and water. There is a State-owned 2,200-ft gravel airstrip, and seaplanes may use the City dock. Regular and charter flights are available from Kodiak however regular air service is frequently cancelled due to visibility limitations. The local gravel airstrip is not suitable for instrument landing or departures making the water taxi a cost-effective alternative for passenger and freight delivery. The local tourist industry depends heavily on being able to use the harbor for transportation of guests and there is water taxi service provided by 3 to 4 different local operators.

The community has a marina partly sheltered by a breakwater constructed by the Corps of Engineers in 1983. The marina is the community lifeline, and cornerstone of the local economy. Because Port Lions is ideally located near the more productive fishing grounds, the regional commercial fishing fleet in need of a moorage facility that exceeds the sheltered area now exists behind the breakwater.

The State Ferry operates bi-monthly from Kodiak between May and October. Barge service is available from Seattle. The local network of gravel roads is adequate to travel from the airport to town and to the ferry dock, a total distance of less than 5 miles. There is no road access to other communities.

Within the greater Kodiak Island area, which includes a number of small villages and cannery locations, there are 1,781 fishing permits of various types and 767 individual permit holders as of year 2000. Of these, at Kodiak proper there are 649 permit holders and 1,010 permits. At Port Lions there are 22 permit holders and 48 licensed crew members. In addition, there are 17 licensed charter operators each operating with 2–3 crewmembers.

Commercial salmon harvest income by the Port Lions fleet is a small part of the total harvest value for Kodiak Island as a whole. The value of the overall Kodiak harvest varied between $105 million and $74 million over the past decade and the value taken by the fleet home ported at Port Lions is generally between $500,000 and $1,000,000.

2.2 Port Lions Harbor Problem Description

The following baseline information (present and future without-project condition) is used in this report as the framework from which project related economic benefits are determined. In this study the term "without-project condition" actually refers to a baseline condition which includes the present Port Lions Small Boat Harbor project but which does not include modifications or repairs to change it in any way from the present condition. The "projects" being evaluated in this report are the several alternative means of modifying the present Port Lions Harbor to improve its performance.

The US Army Corps of Engineers started construction of the rubble mound breakwater at Settler Cove in 1981. The original breakwater was 600 feet long but it was damaged immediately after construction and was reconstructed with larger armor rock and extended 125 feet in 1983. At present the project consists of a 725-foot breakwater extending roughly perpendicular to the western shore of Settler Cove. A 170-foot stub breakwater is also sited on the south side of the main breakwater creating a tidal gap, which is intended to enhance tidal circulation within the harbor basin. Entrance channel dredging was performed at the east end of the breakwater. Armor rock materials came from quarry sites at Anton Larsen Bay and core materials were obtained on site from excavation for harbor uplands.

The breakwaters enclose an approximately 5-acre moorage basin, which is mainly at natural water depths. The harbor was originally scaled to provide moorage for 100 vessels with planned expansion to 124. In 1984 – 85 Alaska Department of Transportation and Public Facilities (ADOT&PF) placed concrete mooring floats that provided 100 slips not including vessels using linear transient space and rafting.

The existing breakwater has maintained its integrity since being reconstructed in 1983; however, it is not reasonably effective at keeping damaging effects of frequent storms out of the harbor. Because of the rough water condition within the harbor, all of the concrete floats have been seriously damaged and many have had to be removed. Despite repeated repair by outside crews flown in for the work, numerous recurring storm events have caused the remaining moorage facilities to continue to show signs of serious damage. Present day harbor use problems were verified during field interviews in 2001 with harbor personnel, vessel operators, ADOT&PF, Alaska District Corps of Engineers (ADCOE), and local officials

As of 2001 more than 60% of the concrete floats had accumulated so much damage that they are considered to be beyond repair. Of the floats remaining in use, the Harbormaster and Mayor are uncomfortable with the risk associated with continued use and anticipate that the finger floats now in service will soon need to be removed from the water to avoid exposing unknowing users to a safety hazard. They anticipate that the removal will be required within the next two years. This would leave the harbor essentially unusable except for a few vessels

which may be able to anchor in the area formerly occupied by the float system or tie up to the skiff / transient dock which will probably remain in place.

Like many of the occupants of the original moorage system, most of the vessels now using the harbor would be forced to relocate. This is a high cost consequence for all of the occupants because there is no permanent moorage available at other Kodiak area ports. One alternative might be for them to haul out for dry storage seasonally but this cannot be done at Port Lions due to lack of a ramp or lifting device. A seasonal haul out would cause them to miss some commercial, charter, and subsistence harvest opportunities. Dry storage can also create shaft alignment problems with inboard powered wood and fiberglass hulls adding to the annual operating cost. Another concern is the added cost of haul out, storage, and related transportation.

Since there is a combination of unreliable protection and unsafe moorage slips at the existing harbor, some boats are currently either beached or left at anchor. Anchored vessels are subject to ravages of sudden storms, and anchoring conditions in the water immediately near Port Lions are known to be so bad that even the larger boats are moved elsewhere when the weather starts to change. At present the only choice open to boat operators without access to one of the few reasonably safe moorages within the limited useful area of the harbor is to leave Port Lions when storms arrive as anchoring in Settler Cove cannot be safely done by boats of any size. The village becomes inaccessible to boats of all sizes during frequent storm conditions.

The original harbor plan, including the breakwater and docks, provided for an estimated 124 boat slips (including transient space). However repeated serious storm damage has rendered the harbor almost unusable and only 35 permanent moorage customers are able to tie up or anchor there year around. During summer periods of fair weather, the harbor is able to accommodate up to 55. This is possible with hot berthing and with some of the marginally safe berths at the fringe of the protected area being temporarily used on calm days. Nevertheless, many of the regular summertime users are forced to remove their boats from the water at warnings of inclement weather, or relocate them to other harbors or distant anchorage areas. The situation has become so serious as to disrupt and discourage use of the harbor even at seasons when the harbor would ordinarily be expected to provide peak occupancy. The wave related problems are obvious to the users and the harbor has a reputation as an undesirable moorage.

Skiffs are launched down a gravel path, which is useable as a launch ramp only on calm days. There is no staging float or improved parking area at the ramp. The marina lacks adequate parking for trailers and vehicles, and there is no restroom facility in the vicinity of the harbor.

2.3 Alternative Harbors

The Kodiak Island area does have some alternative harbors; however they are filled to capacity. In addition to Port Lions, there is one large harbor complex at the city of Kodiak and four smaller ones at other locations on Kodiak Island. There are numerous isolated coves and inlets that provide some measure of temporary fair weather moorage away from populated areas. At all of the harbors, boat damages are common from rafted boats banging

into one another during peak use periods. Wear and tear on lines, fenders, and docks is made worse by the often-overcrowded conditions and time loss is significant when rafted vessels need to be moved around to let someone out. When the harbors are full new arrivals are turned away and must travel great distances to seek shelter from storms. The improved alternative harbors are:

Kodiak - The city of Kodiak is the main population center of the island. The harbor is advertised as being able to accommodate 650 commercial and recreational vessels. Kodiak is about 30 miles by water, from Port Lions and is located near the eastern tip of Kodiak Island in the Gulf of Alaska.

The harbor at Kodiak is operated by the City, which maintains a wait list for prospective moorage customers who are eager to pay $25 per year to have their boat officially in waiting status. Overcrowding of the harbor is a year around problem getting worse as the peak season develops. As of July 2001 the list had 72 vessels, 52 of them being boats under 58 ft, which have paid the $25 fee, and others who have expressed a need for moorage but who, had not yet paid the fee. In addition to the 72 vessels officially listed as waiting for moorage, there are others in need of moorage that are thwarted by the long wait and subsequently discouraged from applying. There are others who store boats on land outside the city, or who occupy berths left temporarily vacant by the regular renter. This later category of occupants is referred to as being “hot berthed” and must move frequently.

The 1964 earthquake and subsequent tidal wave virtually leveled downtown Kodiak. The fishing fleet, processing plant, canneries, and 158 homes were destroyed. The infrastructure was rebuilt, and by 1968, Kodiak had become the largest fishing port in the U.S., in terms of dollar value being in the top three every year of the last decade. The Kodiak based industry and its support services surged when the Magnusson Act, in 1976, extended the U.S. jurisdiction of marine resources to 200 miles offshore. This immediately reduced fishing competition from the foreign fleet and just as quickly allowed Kodiak to develop a groundfish processing industry, which has been maintained as a significant element in the local economic base. Kodiak therefore offers a wealth of marine services and supplies.

Larsen Bay - Larsen Bay, which is located on a bay of the same name, on the northwest coast of Kodiak Island, is 60 miles southwest of the City of Kodiak and 283 miles southwest of Anchorage.

The village area is thought to have been inhabited for at least 2,000 years. Hundreds of artifacts have been uncovered in the area. Russian fur traders frequented the Island in the mid-1700s. In the early 1800s, there was a tannery in Uyak Bay. The present-day Natives are Alutiiq (Russian-Aleuts). Alaska Packers Association built a cannery in the village in 1911. The City was incorporated in 1974.

Larsen Bay is accessible by air and by water. Regular and charter flights are available from Kodiak using a State-owned, lighted 2,700-ft gravel airstrip and a seaplane base. A cargo barge arrives every six weeks from Seattle.

Having a year around population of 115, Larsen Bay is a traditional Alutiiq settlement practicing a commercial fishing and subsistence lifestyle. The economy of Larsen Bay is primarily based on fishing and seasonal operation of the Kodiak Salmon Packers cannery. 15

residents hold commercial fishing permits. There are very few year-round employment positions. A large majority of the population depends on subsistence activities.

A breakwater was completed in 2001, and dock facilities are under construction for a fleet of 25 boats. During the peak demand period the bay can become crowded with more than 50 vessels. Until 2001, the bay did not provide protection from all possible storm conditions so only 5 locally owned vessels were usually left in the water all year. The moorage vacancies at the new dock facility are anticipated to be readily filled by local fishers. After completion of the new dock, addition of spaces would be necessary to accommodate all potential users of long-term moorage at Larsen Bay, however the protected area is a physical constraint on cost-effective expansion. Hence, there are no plans for expansion beyond a breakwater now being constructed to accommodate the local fleet. There is no fee tested wait list however local sources[8] state that they anticipate at minimum of 10 inquiries annually about moorage at Larsen Bay.

Ouzinkie - Ouzinkie is located on the west coast of Spruce Island, adjacent to Kodiak Island. It lies between Kodiak and Port Lions, northwest of the City of Kodiak and 247 air miles southwest of Anchorage. In 1889, the Royal Packing Company constructed a cannery at Ouzinkie. Shortly afterward, the American Packing Company built another. In 1890, a Russian Orthodox Church was built, and in 1927, a post office was established. A cattle ranch was established on the island in the early 1900s.

In 1964, the Good Friday earthquake and resulting tsunami destroyed the Ouzinkie Packing Company cannery. Following the disaster, Columbia Ward bought the remains and rebuilt the store and dock, but not the cannery. The City government was incorporated in 1967. In the late 1960s, the Ouzinkie Seafoods cannery was constructed. The operation was sold to Glacier Bay, and burned down in 1976 shortly after the sale. No canneries have operated since.

Ouzinkie's economic base is primarily commercial salmon fishing and 26 residents hold commercial fishing permits. Almost all of the population of 225 depends to some extent on subsistence activities for various food sources.

The village is accessible by air and water through a State-owned 2,085-ft gravel airstrip and a floatplane landing area at Ouzinkie Harbor. Facilities constructed in 2001 include a breakwater, small boat harbor and dock providing moorage for the local fleet of 27 vessels. The bay is sometimes crowded with vessels awaiting an opening or change in the weather. Since there was no protected harbor at Ouzinkie prior to 2001, there is no history of moorage vacancies and a fee tested wait list is not available. Local sources interviewed in 2001 claim that expansion of the new moorage would be impractical because of the small size of the protected area. They also claim that expansion would be necessary only if outsiders were to start demanding long term moorage at Ouzinkie and they consider growing pressure from outsiders to be unlikely because the nearby Port Lions harbor is likely to be improved and would provide moorage at a better location.

---

[8] Personal communication, City of Larsen Bay, Tammi Aga, October 2001.

Old Harbor - Old Harbor is located on the southeast coast of Kodiak Island, 70 miles southwest of the City of Kodiak and 322 miles southwest of Anchorage. The area around Old Harbor is thought to have been inhabited for nearly 2,000 years. The Russian Grigori Shelikov and his “Three Saints” flagship visited the area in 1784. Three Saints Bay became the first Russian colony in Alaska. In 1788, a tsunami destroyed the settlement. Two more earthquakes struck before 1792. In 1793, the town relocated on the northeast coast to "Saint Paul's," now known as Kodiak. A settlement was reestablished at Three Saints Harbor in 1884. The town was recorded as "Staruigavan," meaning "old harbor" in Russian. The Old Harbor post office was opened in 1931. In 1964, the Good Friday earthquake and resulting tsunami destroyed the community; only two homes and the church remained standing. The community was rebuilt in the same location. The City government was incorporated in 1966.

Old Harbor has a small boat harbor, which was completed in 1967. The project has a depth of 8 ft and has 7 moorage fingers. If all of the available harbor area is used for rafted vessels the protected area is capable of sheltering up to 40 vessels.

2.4 Regional Moorage Use and Need

Boat owners have five major harbor choices on Kodiak Island including Kodiak, Port Lions, Old Harbor, Ouzinkie, and Larsen Bay. Even with planned improvements at Port Lions, all five harbors will remain so overcrowded during peak use periods that boats will raft in less desirable places within the harbors or anchor outside of the protected areas. A need assessment limited to Kodiak Island moorages in 2001 indicated that there was space for about 777 vessels of all sizes. In year 2001, harbors on the island had 102 vessels waiting for suitable moorage. The 102 wait listed vessels are the basis for a low range estimate of moorage need at Kodiak Island because it does not include wait listed vessels at off-island harbors adjacent to Kodiak Island and does not include transient vessels or the summer time surge in moorage demand.

Looking beyond Kodiak Island, there are many vessels that fish in the KMA that would profit from having a moorage closer to the fishing grounds near the island. For example, of the 616 average annual active salmon fishers actually harvesting in KMA waters during the decade of the 1990’s, only 23% have addresses on Kodiak Island. There are about 468 KMA fishers operating from harbors off the island and who could possibly profit by having moorage closer to their selected salmon fishing area. Additional moorage on Kodiak Island, such as at Port Lions, would serve this end. Therefore, if the study area is expanded to include some of the nearby off-island harbors such as Homer (wait list of 300 in this example) potentially up to 300 more wait-listed vessels could conceivable be added to those now wait listed at harbors on Kodiak Island. This example would indicate that there is a regional slip deficit of 402 (102 wait listed on the island and at least 300 more wait listed adjacent to the island).

In addition to the 402 awaiting moorage, if the seasonal influx of out of state vessels is also counted as being included as part of the regional moorage need, another 222 would be added for an upper bound estimate of 624. This upper bound estimate of 624 is an estimate of total moorage needs within a 120-mile radius of Port Lions for vessels of all sizes.

If the need estimate is limited to Kodiak Island, and high season needs are also included, the need estimate becomes 324 (102 wait listed locally plus a local seasonal influx of 222). The seasonal influx of out of state vessels happens during May – October. This "all seasons" estimate recognizes that of the 15,800 vessels registered in the state, 3,300 of them have owner's addresses in Washington, Oregon, or California. These out of state vessels are brought into the state during harvest seasons thus increasing the number of vessels needing harbor facilities on average, by about 26%.

The "average daily all species summer season fleet" operating near Kodiak is estimated at 1.26 x 856 vessels of all sizes home ported there = 1,078 (856 is the number of vessels of all sizes showing Kodiak addresses although some are hauled out of the water or kept elsewhere due to non-availability of moorage). With 777 moorage spaces available on Kodiak Island there is an unmet need for at least 301 slips during the May – October period without looking at vessels wait listed at the off-island areas.

The above "all seasons" estimate of Kodiak Island moorage needs is a somewhat understated high-range estimate because the "all seasons" estimating procedure actually smoothes the short term spikes by focusing on "average daily use" during multi-week periods. Based on opinions of Kodiak area harbormasters, peak moorage demand on the highest day of the year (including arrivals that are turned away, rafting of short term visitors, hot berthing, call ins not accommodated, permanent customers, transient visitors, stops for commercial fishing and commercial transportation purposes, recreation vessels, subsistence, and charter use) is generally half again the number that the harbor is designed to accommodate on a long term basis. This would be about 1,165 vessels for the island as a whole. There is no actual verifiable statistical count of peak demand at any of the harbors because over capacity customers are turned away without being kept track of. Operational complications associated with peak use are capable of imposing huge economic costs on harbor users and operators in the form of delay, congestion, damages, and lost time. To some extent, many of these problems would continue at all ports as a normal part of the commercial fishing environment regardless of improvements at Port Lions.

A lower bound estimate would exclude Homer customers and exclude the seasonal influx and would indicate a need for 102more slips of all sizes during the low demand period for the island as a whole.

When considering only the local Kodiak Island fleet less than 58 ft in length, at the lowest use time of year there is a documented need for a minimum of 85 additional spaces[9]. The salmon fleet is made up of vessels under 58 ft, and the table below summarizes Kodiak Island moorage use and demand by vessels under 58 ft for the without-project condition.

[9] Estimate based on wait list data and personal communications.

Table 2. Kodiak Island Moorage Use by Commercial Vessels Under 58 ft

	Current Permanent Use	Wait List Customers	High Season Demand Increment	With Additional High Season Kodiak Island Customers
Kodiak	469[10]	55	136	660
Port Lions	35[11]	10[12]	32	77[13]
Larsen Bay	25[14]	10[15]	9	44[16]
Ouzinkie	27	N/a[17]	7	34[18]
Old Harbor	40	10	13	63[19]
W/O Project	596	85[20]	197	878[21]

[10] Derived from cfec data for registered salmon vessels to identify vessels under 58' as part of the total number of Kodiak area registered vessels, 856.

[11] Number of year around customers. Another 20 use the project during fair weather periods.

[12] The poor moorage protection at Port Lions discourages people from leaving vessels when they might be subject to storm damage. There are regular inquiries primarily from the Homer area but they are turned away due to the unsafe conditions at Port Lions. During a year there are about 10 requests for permanent moorage but a formal list is not kept.

[13] Estimated based on summertime use and restoration of the damaged slips.

[14] Intended capacity of a float system now under construction.

[15] Formal wait list is not kept. A minimum of 10 is assumed based on frequency of inquiries.

[16] Estimated based on 26% seasonal influx of vessels to the Kodiak area. Users of Larsen Bay have offered the opinion that if twice the number of moorages were available they would be used.

[17] Locals are unsure because harbor was not yet complete at the time of inquiry.

[18] Estimated by using vessels moving into the area seasonally. The area is used as a storm anchorage and frequently is crowded with vessels waiting for safe conditions outside the bite.

[19] Estimated using seasonal increase in number of vessels. State sources estimate the number of vessels normally using Old Harbor at 55. Corps sources place the originally intended moorage capacity at 40 vessels.

[20] This total becomes 382 if the wait-listed vessels at Homer are counted.

[21] Excludes Homer.

2.5 Characteristics of the Moorage Demand in the Without-Project Condition

Most of the Kodiak based boats, which have permanent moorage space, and those wait listed, are owned by people who use a local address on their vessel registration. Local owners are more common among the block of vessels 58 ft and under.

As the vessel sizes exceed 58 ft, there is a sudden jump to significantly larger vessels and absentee ownerships. This is because vessels larger than 58 ft are generally ineligible for salmon permits, but in other fisheries the larger vessels are more versatile, more productive and hence more profitable; and the vessels over 58 ft are most likely to fish Alaska waters part of the year, and use distant waters in Washington, Oregon, or California as a home port. Of the 3,877 out of state vessels, 40% have a length over 58 ft.

On the Kodiak harbor wait list for vessels of all sizes there were 72 waiting when a detailed review of wait-listed vessels was made in 2001. Of these 33% have addresses not on Kodiak Island, and 21% have addresses out of state. Of the wait-listed vessels 58 ft and under, there are 14 with addresses outside of Kodiak Island and none with addresses out of state.

2.6 Potential Port Lions Moorage Demand by Vessels Under 58 ft

The number of boats moored at permanent anchor buoys near Port Lions (north end of Kodiak Island) includes 30 year-around charter and commercial fishing boats and 22 open boats suitable for fair weather use in sheltered waters. Although the smaller open boats are sometimes left at anchor, it is more common for them to be dragged up on the beach over the rocks, and left above the high tide. During the warmer months when both sport and commercial fishing are popular, an additional 50 boats anchor in the vicinity. These 50 boats return to the Port Lions area annually as their primary base of operations.

Port Lions is also host to a number of vessels, which make stops in transit to other destinations. Each year the village experience visits from up to 150 transit vessels, some of them making repeat visit during the May-September period. Visits from transient vessels ordinarily last from a few hours to less than four days. It would be very uncommon for more than ten transient vessels, or less than two, to be at the village during any summer time period of 48 hours during a fishing closure. Visits by transients are kept short because Port Lions is not considered to be a safe haven and the dilapidated condition of the vacant moorage slips adds to the risk, which is minimized, by keeping turn around time short.

In the without-project condition, the short-term and long-term vessels that can be either moored or anchored within 3 hours of Port Lions during the summer include 613 potential Port Lions customers. This does not include the usual 22 skiffs in regular use at the village as they are ordinarily dragged from the water when not needed however the estimate probably includes some unverified double counting stemming from the nature of the data:

	# of Vessels
Permanent commercial and subsistence fishing vessels using moorage of the inner harbor	35
Hot-berthed seasonal vessels that have been regular visitors	20
Vessels wait listed in the vicinity	102
Salmon fishers that operate closer to Port Lions than Kodiak	456
Total	613

About 35% of the vessels wait listed at other harbors can be taken off the Port Lions potential customer list because they are interested in a specific moorage arrangement which may not be consistent with the configuration or location of Port Lions. The inference was made by looking at the wait list for Kodiak and noting that about 35% of the vessels on the list were seeking improved moorage not new moorage. These vessels were already marginally accommodated at Kodiak but found their particular moorage arrangement troublesome for the vessel configuration they were attempting to operate. Thus, the 613 potential candidates were reduced to a pool of 398 high potential moorage customers by down-rating the entire inventory of potential customers. This across-the-board reduction is somewhat aggressive in the sense that absentee owners of commercial vessels will seek Port Lions because of its proximity to the fishing grounds; and because of the security that the harbor is expected to provide.

2.7 Moorage Practices of a Potential Port Lions Fleet

An improved Port Lions harbor will become a harbor for vessels that fish the waters nearby on a regular basis, especially the commercial vessels that do not now have a suitable permanent slip at a protected harbor. During the mid May through September primary salmon fishing seasons, slips normally under lease to commercial vessels will be available to transient users under what is called a "hot berthing" arrangement on the days that they are not being used. The hot berthing concept is generally applied year around at many ports however, even as a regular practice it cannot significantly increase the number of vessels that can be tied to slips during the course of a year. The reason is that periods of absence by the primary user are not regular or predictable at a reasonable level of accuracy; and among salmon fishers a given slip may be vacant only 2 - 4 days per week. In addition, any secondary user will be an unscheduled random arrival thereby increasing prospects that his need may not mesh perfectly with a slip vacancy thus increasing the possibility that the hot berthed customer will need to relocate to another temporarily vacant slip when the regular occupant returns. Several berths may be necessary to accommodate a single hot-berthed customer.

Hot berthing policy, however does allow a harbor to help accommodate recreation users who rely on use of vacant commercial slips during the summer. With hot berthing, a harbor that is 100% leased to commercial vessels can serve additional recreation craft for short periods during the peak recreation season. The State of Alaska and the sponsor, support a harbor management policy that will encourage and accommodate recreation use. This is possible without incurring any incremental costs specifically for recreation development. In the case of an improved Port Lions Harbor all recreation use will be incidental to the commercial purpose of the project.

Many fishing vessels are equipped to target other commercial stocks after the salmon fisheries have closed and will travel to waters beyond Kodiak to access other stocks which they are equipped to harvest. Commercial fishing vessels will be most likely to be tied up at times when it is least likely for there to be hot berthing customers available. Put another way, commercial vessels will lease slips on a full time permanent basis, but much of the time they are out fishing leaving a vacant slip for use by someone else. A Kodiak area

commercial fishing vessel under 58 ft would be least likely to be fishing in the dead of winter so would be using the slip at a time when it is least likely to be in demand by incidental users.

Slips are generally in use by the leasing vessel at least 145-235 days per year. The high end of occupancy days nets out the block of time that limited use vessels are most likely to be involved in activities related to harvesting salmon and the low end of the range allows time away for multi-species harvesting days except during mid-winter.

A permanent moorage at Port Lions for a commercial vessel with an absentee owner would require one trip by skiff or airplane, each year to ready the boat before the season, and another to secure it at seasons end. Both of these trips plus performance of off-season maintenance by a harbor attendant are a common practice at other Alaska harbors.

The characteristics of a future Port Lions fleet are similar to the fleet under 58 ft, which is wait-listed at Kodiak. Both fleets target the same waters and the Kodiak wait list is of sufficient size to serve as a basis for making a statistical inference of vessel size classes.

Table 3. Kodiak Harbor Wait List Size Distribution[22]

Number of Vessels	0 to 22 ft	23 to 36 ft	37 to 54 ft	> 55 ft	Total
Fishing & Charter	3	23	22	4	52
Recreation/Subsistence		1	2		3
Totals	3[23]	24	25	4	55
Percent	5%	43%	45%	7%	100%

The future growth rate for the charter industry at Port Lions will probably outstrip the future rate at Kodiak. This is because the numerical base is smaller at Port Lions despite the fact that Port Lions and Kodiak have both become established as destinations for hunting and fishing. Plane, boat, and ferry connections make Port Lions easily and quickly accessible to charter customers coming through Kodiak, but the harbor has been a limiting factor for development of the industry. Improvements at Port Lions will convert marginal moorage to prime moorage and the projected future fleet is anticipated to be made up primarily, if not exclusively of commercial and charter vessels.

Table 4. Port Lions Future Fleet Size Distribution

	0 to 22 ft	23 to 36 ft	37 to 54 ft	> 55 ft	Total
Number of Vessels	5	54	56	9	124

[22] Percentages are derived from distribution of wait-listed vessels at Kodiak's St Hermans Harbor reclassified to fit into vessel size classes having particular cost characteristics.

[23] Excludes beachable skiffs.

The maximum size vessel at Port Lions is anticipated to be no larger than 58 ft. Purse seine is the most common type of transient commercial vessel holding permits to fish in the Kodiak area, and they are limited to 58 ft in their primary use as salmon harvesters.

2.8 Relation Between Type of Fishery and Type of Vessel

Fishing regulations limit harvest by species and they also limit activity by location, and time of year. Many of the regulations reach into actual practices, which may be used for harvesting with strictly enforced rules relating to the size of boat, and the type and amount of gear that is allowed. The type of fishery, (salmon, bottom fish, crab, etc.) and the general location such as Shelikof Strait, Cook Inlet, Gulf of Alaska, Kodiak Management Area, and the numerous statistical areas within each have unique regulations. The regulations determine the type and size of vessels that can be put to use by the commercial fleet and to some extent regulations also indirectly determine the number of fishers. This is because regulations generally limit the allowable harvest; and harvest success in terms of profitability will determine the number of vessels.

The following is an overview discussion of the type of fleet common in the vicinity of Port Lions. Net fisheries include drift gillnets, set gillnets, and purse seines all of which are allowed for salmon fishing in various parts of the KMA; and all of the KMA open fishing areas are readily accessible from Port Lions.

Drift Gillnets - State regulations stipulate an allowable net size and this in turn places a practical restriction on the minimum size gill net vessel that can safely and effectively be used. For economic reasons fishers will use the gear that will result in the largest catch per unit of effort while maintaining the safe achievement cost per unit of effort, so the upper limit of gear size tends to dictate the lower limit of vessel size. That is, vessel size will not be so small as to cause an overloading of the vessel, or stability problems with the net, gear, crew, fuel and catch aboard, in bad sea conditions.

Generally these gillnet vessels range in size from 34 to 49 ft and are identifiable by a large hydraulically operated reel, or drum, near the bow or stern upon which the net is stored and from where it is launched and retrieved. The vessel is typically fitted with a gas or diesel powered out drive that allows it to operate in shallow water and makes clearing of debris from the drive unit easier. The house is placed at the extreme opposite end from the roller in a way that maximizes the deck area needed to manage the net and catch. In general vessel beams are about 30% of overall length. They typically draw less than 6 ft draft and are operated by 2 to 4 persons.

Vessels at the higher end of the size range are typically small combination boats, which will also be used in longline or pot fisheries. A few at the very upper end of the size range may be older hulls which were primarily designed and rigged under regulations prior to 1962, when 50 ft was a size restriction for purse seiners and were subsequently converted to combination boats used in the gillnet fishery.

There are many wood and fiberglass vessels in the fleet. Size requirements and working conditions do not dictate the use of steel or aluminum. There is a trend to use of aluminum, which is proving to be a rugged, long lasting, and low maintenance material even compared to fiberglass.

Set Gillnets - These nets are of the same size as drift gillnets but they may be anchored in place or set in place with stakes. It is possible to use them in near shore waters and tend them from the beach with a smaller boat. These vessels are more typically outboard or out drive equipped open boats near the lower end of the size range. They typically draw less than 4 ft. Fiberglass and aluminum are the most common materials.

Purse Seine - Purse seiners with salmon permits are limited to a maximum overall length of 58 ft. Most of the vessels close to the maximum size limit are unique designs, which allow them to be used productively in other fisheries as well, and for that reason, they are generally referred to as combination boats. One unique aspect is the flexibility of deck gear combinations and a more obvious design characteristic is the generous beam measure. Since these boats must be able to perform as crabbers, longliners, and to a certain extent as trawlers, stability and capacity are enhanced through generous beam measurements and a deep hull configuration. Some of the new designs carry beam measurements that exceed 40% of the overall vessel length. Combination boats are characteristically in the 49 to 58 ft size range and can draft up to 10 ft. Some of the newer vessels are below the maximum size limit, but characteristically they also carry the 0.40 length to beam ratio. Most of the newer vessels are manufactured of welded aluminum.

The primary problem is the lack of adequate wave protection for the inner harbor facilities and moored vessels. The mooring basin is subject to severe damages and undesirable wave conditions from northeast waves entering the basin through the tidal gap and around the deep-water end of the main breakwater. Damages are also caused by smaller, locally generated waves from the southwest. Wave heights of three to five feet have been observed within the harbor limits. There are continual inquiries from vessel owners wanting to use the facility to escape storms. Other vessels want to use the harbor year around but are turned away because of the dangerous moorage conditions.

3.0 VESSEL OPERATING PRACTICES

3.1 Trip Duration and Crew Hours

Choosing a time to fish (which stock to target) and determining the length of the trip is a major decision made by the skipper of a fishing vessel because where a skipper fishes and the amount of time spent harvesting are important factors in determining the size and value of the catch. In deciding how long to fish, a skipper must consider not only the legal restrictions and the catches he is likely to make at different locations but also the cost incurred in fishing at those locations.

In the time span of say a week or less, the skipper has a limited number of ways that he can respond to changes in regulated openings and changes in locations where fish are anticipated to be available. Time dictates that he cannot alter the vessel in any major way such as conversion from trawl to seine, but he can change the harvest location and amount of time that he is traveling, fishing, or idle. He will avoid excessively long trips because travel cost is high and time used up in travel might cause him to miss harvest days during which fixed and variable costs will continue to mount.

Profitability of the harvest depends not only on fish density and fish prices but also on the revenue that must be distributed as crew shares and many other costs that must be recovered. Recovery of fixed and variable costs plus a profit is the objective, and like the hourly cost of steamships, railroads, trucks, farms, forestry equipment and airliners, all cost components need to be recognized in establishment of hourly, daily and seasonal operating budgets. Measurement of cost in terms of dollars per hour of use is standard in the transportation industry and it is also standard procedure in agriculture, forestry, and fishery industries.

Total hourly cost will influence trip duration because in order to stay in business the value of the harvest must recover total cost not just the variable cost. Since cost recovery by harvesting can be accomplished only during legally allowed windows often of short duration, the expected value of the harvest is weighed against the expected total cost of the trip to plan fishing windows and locations. The total trip cost includes the hourly cost of the time it takes to prepare, steam, harvest, and return.

Each harvesting job aboard a “full-time” fishing vessel is generally viewed as a full time equivalent position because of the common crossover participation in salmon, halibut, cod, sablefish, and crab fishing. Nevertheless, “full-time” fishing vessels (in the sense of 12 months of active harvesting) are practically non-existent in Alaska waters. Some individuals try to stay gainfully employed aboard a mix of vessels while others fish a particular vessel that might venture outside of the Kodiak area, and maybe even outside of the state. Even so, 12 months of active harvesting with regular work hours are practically unheard of.

Because harvest regulations sometimes impose short notice closures, fishing does not follow daily regular and predictable patterns, and fishermen do not work eight-hour days or five-day weeks. A hypothetical vessel with multiple permits is used in this report to explain why the typical hours fished annually are estimated at 1820 (median value given a number of fishing days ranging from 40–220, and 14 hour days). Total non-fishing labor hours associated with the business would add to this amount.

Based on examination of actual open season periods, it has been determined that many of the Kodiak area commercial salmon fishermen change fishing locations or return to port generally at 2-4 day intervals.[24] At the other extreme there are some years in which returns to port may be at nearly two-week intervals.

The salmon season is ordinarily divided into numerous short openings at various locations and the time between openings will generally last 2 – 3 days. During this 2 - 3 day period, fishers will either move to a different location where they might also be permitted to fish, or they return to port or find a safe anchorage. They move to another fishery if an alternative harvest location is going to be open provided it is one that they are familiar with, is not too far away to reach, they have arrangements with a tender or cannery to sell the fish to; and providing that the location is anticipated to provide a profitable harvest for costs incurred during the 2 - 3 day window. They return to port for the 2 to 3 day closures if their favored fishing location is close to their homeport or preferred layover, and if they feel secure that they will not lose their crew by returning to port. Potential loss of even one crew member during port calls is a major concern because it destroys the vessel's earning opportunity for the balance of the season. They might elect to find a suitable anchorage if there is one close by that can be considered safe should adverse weather develops and if the crew is willing to stay aboard the anchored vessel. There might however be a need to return to port for crew rest, parts and supplies, fuel, catch delivery etc.

For the fleet that operates out of Kodiak and Port Lions, and the expanded fleet that will operate out of Port Lions in the with-project condition, the harvest locations are within a few hours run of the harbor. There is little incentive to anchor out awaiting the next opening when a short return to port offers the advantage of time to be spent near home and family. This appears to be a powerful incentive making the return to Kodiak and Port Lions a common practice for home ported vessels with reliable crews.

Based on discussions with area fishermen, they see themselves being involved in the harvesting about 130 days. For Kodiak area multi permit vessels less than 58 ft, the 130 days generally includes the salmon season plus one other fishery. In the 130 days there are many layover days due to short closures, time needed for repairs, re-gearing, replacement of stores and supplies, planned and emergency haul-outs, crew breaks, etc. During the period of a year, the operator makes every attempt to minimize idle time for the boat during hours when harvesting is allowed. There is no standard number of days, or number of hours worked. Generally the larger the boat, the more days the crew will be actively involved in the harvest because it is more likely to hold multiple permits. A smaller boat with short season gill net permits may be active harvesting only 40 days a year (typically salmon and herring). At the

[24] The record of 1999 open fishing periods was examined for the Kodiak area and for Prince William Sound in 1998. Two different years and two different areas were used because the openings sometimes vary widely form year to year for a given area. In PWS for 1998 there were 29 openings fir the gillnet salmon fishery in the Copper River District. Most of the openings were of 24-hour duration and they spanned a period of 95 days leaving about 3 days between openings. In the Coghills District there were 25 openings over a period of 105 days. Many of the open periods were 12 hours or less. Average time between openings was about 3 days. In 1999 for the Kodiak area there were 43 gillnet and seine openings ranging from 6 hours to 81 hours. 13 of them were sampled to determine an average opening of 42 hours. There were about 2 days between openings.

other extreme a large boat capable of exercising distant water permits will harvest 220 days (typically crab, halibut, shrimp, cod and salmon).

A recent study of crew hours worked in the western Alaska harvest indicated crews work 18.3 hours to 19.3 hours a day during the harvest depending on the type of fishery. When in port, crews work 9.5 hours to 14.5 hours per day, and when steaming to and from the fishing grounds 6 hours to 12.3 hours per day. Using a 130 day active vessel harvest operating season and 14 hours as a representative work day, fishing crews can be expected to be involved in harvest or harvest related activities in Alaska waters about 1820 hours per year. This is comparable to the 1920 annual production hours spent by persons employed full time in other occupations if three weeks of vacation time, two weeks of special holidays, three weeks of sick time, 104 weekend days, and an 8-hour work shift are included during the year.

During the course of a season the time the crew is busy will exceed the number of hours the main engines are being run because of shut down during moorage, loading, and offloading. Fuel consumption continues however because auxiliary generators and refrigeration plants run practically all of the time that anyone is aboard.

None of the cost, income, and time associated with harvesting outside the Kodiak area waters is addressed specifically in this report because that fishing activity will not be impacted by improvements at Port Lions. So the applied hypothetical 130 harvest days and 1820-hour work year relate only to the activity in waters around Kodiak Island. Adding other ventures to the operating cost budgets in this report would increase cost, income, and time.

3.2 Fishing Seasons

Kodiak area fishermen, like most others in Alaska and elsewhere, almost always fish in several fisheries to make a living. Most of the open fishing periods will vary from year to year. The following table lists the general opening times of the various fisheries in the area. The illustrated openings are subject to emergency closures beyond the level of detail shown in the table. For most of the multi species fishers the “year” in which the active harvesting takes place is effectively a four to ten month period when they will either be actually fishing, traveling, involved in preparation or other fishing related tasks, or available to fish and awaiting an opening.

For some species some of the seasons have peculiar restrictions that apply to the amount of time a vessel can fish during the open season. For example the general salmon season is open from sometime in June to the first or second week of September but it is operated in a way that allows early harvesting only 2–4 days per week at various locations. As the season advances, there are frequent occasions of concurrent multiple short openings at multiple locations. However even at the height of the fish runs harvesting is allowed at many locations only 4–5 days per week and at some locations not at all.

For some multi species fishers less than half the active harvest time would be devoted to activities related to salmon harvest. For example, in 1999 the combined salmon openings spanned 105 days. Actual individual openings within the 105-day period varied from a minimum of 6 hours for the Kodiak Humpy-Deadman Section to a maximum of 81 hours at some other locations. Looking beyond the actual salmon harvest days extends the vessels participation days to 130 for many fishers by including an interlocking herring opening plus

season preparation, transit to and from the fishing grounds, and wind-down time. For some of the larger boats the season is considerably longer and includes taking of crab, halibut, shrimp, sablefish, and cod in addition to salmon. Some large combination vessels have adequate equipment and permits to fish almost year around and venture to offshore areas part of the year. Only the vessel participation time related to the salmon harvest is relevant in this report because salmon fishers are the largest economic beneficiaries of protected moorage at Port Lions. As the largest beneficiaries they have the largest incentive for locating there.

Table 5. Timing Of Kodiak Area Fisheries

General Season	Gear	J	F	M	A	M	J	J	A	S	O	N	D
Salmon	Seine or Net												
Dungeness	Pot												
Tanner	Pot												
Shrimp	Pot												
Shrimp	Trawl												
Halibut	Longline												
Pacific Cod	Open gear												
Crab, Summer	Pot												
Crab, Winter	Pot												
Herring Bait	Seine												
Herring Roe	Seine												
Rockfish	Jig												

Fishermen are increasingly using charter operations to fill in when there is down time or slack time in other fisheries. Most charter operations focus on salmon and halibut fishing between May and September however there is a growing demand for wintertime charter experiences.

4.0 VESSEL OPERATING BUDGETS

4.1 Without-Project Opportunity Cost

In analyzing the proposed harbor, the economic effects are measured and expressed in terms of National Economic Development (NED)[25]. The effects are identified as gains or losses in the nation's output of goods and services, or a corresponding increase or reduction in the net income effects of achieving a given level of goods and services on a nationwide basis. In this study, these effects are expressed as a change in harvest cost, or net income as it is related to operations dealing with transportation services and fish harvest[26].

Relevant cost changes are likely to take the form of savings in unit cost of transport, handling, storage, and delay. NED economics encourages use of an opportunity cost approach to capture values of goods and services including those that are marketed and those that are not.[27] Using opportunity cost the value of an hour of delay during the limited open harvest time would be equal to loss of hourly earnings that would otherwise be necessary on an hourly basis, to break even during the hour. So, the opportunity cost of delay would be measured in terms of lost earning power, or put another way it is time that is not paid for because the hour is not used for harvest activity. This view of the value of opportunity cost is most obviously true where fishers operate in an Individual Fishermen Quota (IFQ) fishery because an individual fisher's lost earning power (non-harvested quota) cannot be harvested by others and is therefore an unrecoverable loss to the industry. Clearly in the case of IFQ the loss to the fisher is therefore a loss to the nation as well. This is also true where there is an open entry non-quota fishery because lost time amounts to taking capacity out of production and this results in a larger non-harvested resource.

As in any business, in order to at least break even during the course of a year each vessel must recover both its fixed and variable cost. Vessels, which cannot produce annual income above this earning threshold, will not be able to compete in the end and will go out of business. Therefore, as a viable business operation each separable work unit (vessel) must recoup its cost of capital and other fixed cost in addition to variable cost. In that sense, the economic analysis of equipment used in commercial fishing operations is similar to the type of economic analysis applied to evaluate equipment used in commercial highway, water, rail, and air transportation operations. The economic viability of equipment is evaluated by comparing its contribution to income against its total costs. Total costs are typically presented in terms of cost per hour for the purpose of illustrating the amount of gross hourly income that must be taken in to cover the bundle of hourly costs relevant to a specific piece

---

[25]Economic and Environmental principles and Guidelines for Water and Related Land Resource Implementation Studies, aka P&G as presented in Corps of Engineers Engineer Regulation ER 1105-2-100, paragraph 5-3.

[26]ER 1105-2-100, paragraph 6-123.c.

[27] National Economic Development Procedures Manual NED Costs, IWR Report 91-R-13, June 1993, page 23, National Economic Development Procedures manual, Overview Manual for Conducting National Economic Development Analysis, IWR Report 91-R-11, October 1992, page 38.

of equipment (plane, train, truck, tractor, or fishing boat) in order to reach a breakeven operation.

4.2 Economic Cost vs. Monetary Cost

There is frequently a large difference between economic effects measured in terms of economic cost (NED opportunity cost) and in terms of financial cost or cash flow. The economic cost or opportunity cost is generally much larger since it takes into account the cost of all resources whether paid for in cash or not. For example the annual opportunity cost of a fishing vessel would include hourly equivalents of fixed costs since fixed costs represent part of the bundle of goods and services that makes it possible to operate the vessel for even a short period of time. In contrast, the out of pocket financial cost of one hour of operation could probably be reduced to the cost of fuel for an hour. Standardized economic evaluation procedures using benefit-cost analysis rely on opportunity cost. For example, where Corps studies evaluate improvements in deep-draft harbors, hourly economic cost is estimated by including the hourly equivalents of insurance, the capital cost of the vessel, and relevant overheads, in addition to the cost of fuel, food, crew, and so on.

Limiting the economic evaluation to the cash flow financial measure tends to create an understatement of economic effects because a strict monetary measure fails to account for all resource effects. This is because as a harbor modification introduces efficiency, a fisher will have more time available for the overall harvest. This can have a positive economic value because it can increase earning opportunities. For example, given that there are some open entry fisheries and others that operate under an IFQ program; this added time can increase income of individual fishers and income for fishers as a whole. In the event of this potential increased harvest the economic effects cannot ignore the fact that a capital commitment is required in order to conduct the harvest although a strict cash flow analysis would not identify this. A strict cash flow analysis would also ignore “other direct effects” that can represent NED benefits or economic costs.

In spite of some non-harvested quotas and some commercial stocks not under quota limitations in the Kodiak area such as shrimp and Pacific Cod increased harvest is not evaluated in this appendix. This appendix does not address “new harvests” or “increased catches” or impacts on price. Benefits are based primarily on Port Lions being the least cost location for harvesting because of proximity to harvest areas and an increase in its use because of the project effects and secondarily on related economic effects such as avoided maintenance cost and improved safety for the fleet.

4.3 With-Project Opportunity Cost

Although the fleet is characterized primarily as purse seine, or gill net vessels, they are to a certain extent all multi-use boats. If a hypothetical vessel fishes in all available and profitable fisheries, it can be active, (fishing, ready for fishing, or being made ready for fishing) from four to ten months a year. Vessels below 58 ft generally capitalize on the salmon harvest and operate about 130 days during which an about 1,820 hours typically will be spent harvesting. Preparation, re-provisioning, off-loading, repair, lay days, and travel

times are included in the season. Not included is the idle time between annual cycles, or long-term vessel lay-up.

The total vessel operating cost for a season is based on the number of days spanned by the season. In other words for a given type and size of vessel the season cost will vary as the length of the season varies. For calculation of total season fuel cost the vessels were assumed to be in operation 24 hours per day with high power and low power cycles. The average hourly cost range for each specific type of vessel is largely dependent on what one assumes is the appropriate number of hours to divide into the season total cost. For a high range and low range hourly cost of fuel there are up to 1,820 harvest related operating hours; and up to 3,120 season hours respectively. Varying these hours representing harvest and crew activity on the one hand, and total season hours on the other yields average hourly cash cost for the salmon purse seine vessels ranging from $60.00 to $42.00. The hourly cost of the gill net vessels will range from $25 to $11. The following tables show the fixed and variable costs of operating the typical vessel types. Data was obtained from interviews with fishermen and published studies.

Table 6. Typical Vessels In The Expanded Port Lions Fleet

Description [28]	58 ft Seine/Longline/ Crab	45 ft Seine/Longline/ Pot/Jig	32 ft Longline/Net	22 ft Net
Investment	$336,000	$143,000	$67,000	$33,600
Length x Beam	58 x 19	45x17	32x13	9x22
Draft ft	8	6	4	3
Fish hold lb.	60,000	30,000	12,000	n.a
Main Power load rate "B" [29] for displacement hull	Twin Cat 3208 turbo	Twin Cat 3208 turbo	Single Cat 3208 turbo	Volvo Penta gas I-O

[28] This choice of "typical vessels" is based on actual vessels in service in the area adjacent to Port Lions, and in the fisheries to be targeted in the with-project condition. Characteristics of the descriptions were gleaned from 200 sample sales listings in 2000 adjusted for price level.

[29] Manufacturers criteria for use in displacement hull vessels such as seiners, trawlers, crew boats, ferries and towboats. There can be frequent slowing but engine load is constant with some cycling.

Table 7. Operating Data, Typical Expanded Port Lions Fleet

	58 ft Seine/Longline/ Crab	45 ft Seine/Longline/ Pot/Jig	32 ft Longline/Net	22 ft Net
H.P.	510	510	255	100 - 200
Fuel use rate [30]	10 gph at 25% power, and 28 gph at 85% power	10 gph at 25% power, and 28 gph at 85% power	5 gph at 25% power and 14 gph at 85% power	6 – 12 gph, 9 average
Crew	4	4	3	2
Potential number of open fishing days with 12 hrs at 85% power and 12 hrs at 25% power. [31](14 hour crew day typical)	130	130	120	60
Hours per crewman	1,820	1,820	1,680	840
Hours per season [32]	3,120	3,120	2,880	2,160
Harvest operating hours	1,820	1,820	1,680	840

Load factor: 40% to 80%. Up to 80% time at rated rpm.
Typical time at full load: 10 hrs out of 12.
Typical hrs/yr: 3000 to 5000.
Typical applications: Vessels such as midwater trawlers, purse seiners, crew and supply boats, and ferries, where engine load and speed are constant with some cycling; and towboats where conditions dictate frequent slowing.

[30] Diesel use rates from Caterpillar technical services library for Marine Applications, gas from Volvo Penta users. Caterpillar defines the appropriate fuel rating as Medium Duty Commercial for displacement hull moderate duty service where engine load and speed are essentially constant with some cycling.

[31] From operating scenarios developed during interviews with area fishermen at Port Lions and Kodiak in 2001. A typical seine day requires repeated sets and runs after moving to the grounds at maximum power. Some days will require 24-hour operation at high power settings. On other days the vessel will spend time at low power offloading, avoiding weather, or awaiting an opening. Runs to and from port or for fish delivery are at maximum power. In port or at anchor low power settings are operated for refrigeration and generation.

[32] Hours will vary from year to year and from area to area. This is a mid-range estimate compiled from a record of openings in south central Alaska, which includes the KMA.

Table 8. Typical Annual Operating Budget, Port Lions Fleet

Fixed Cost [33]	58 ft Seine/Longline/ Crab	45 ft Seine/Longline/ Pot/Jig	32 ft Longline/Net	22 ft Net
Hull Insurance @ 5%	16,000	6,700	3,000	1,500
P&I Insurance @ 2%	6,400	2,700	1,200	600
License/permit fees [34]	18,300	9,000	5,400	900
Association dues	1,000	500	300	200
Business expenses [35]	6,700	2,900	1,300	700
Food [36]	13,000	11,800	4,400	2,400
Return on capital	21,000	8,900	4,200	2,100
Crew share [37]	191,400	133,200	59,800	22,700
Variable Cost [38]				
Fuel [39]	77,100	77,100	35,600	10,400
Repair/maintenance[40]	31,900	13,600	6,400	3,200
Total	$382,800	$266,400	$123,600	$44,000

[33] Fixed costs are incurred whether or not the vessel is involved in harvesting.

[34] Using $2,200 as an average of <100' pot and trawl vessels; it was prorated by length of the harvest activity. An amount equal to 5% of vessel value was added to allow for IFQ end of season fees at 3% of gross harvest. References to Study and Houston et al in 1997 indicates license and fees range from 2% - 5% of annual gross harvest. Permits amortized over 7 years would include salmon $10K, herring $30K, crab $20K, and IFQ $40K.

[35] Business expense (management) is estimated at 2% of capital investment and is treated as a fixed cost. Fees include tax filing and related tax accounting, business income and expense record keeping, payroll and personnel management, contract negotiation, legal review, account and credit management, travel and entertainment. Management related to operational decision is a variable cost. ER 1105-2-100 page E-55 describes Management as 10% of variable cost (see Risk and Uncertainty Section of this report for discussion of management as a variable cost).

[36] Anecdotal based on at site conversations with fishers in 1998 and 1999 estimating dollar expenditures for a season. Also see Radtke and Davis, Table 9. Percentages averaged across five fisheries and presented as a percentage of total costs range from 2% to 3% depending on type of vessel. Type of vessel determines size of crew and length of time at sea. In contrast, the Alaska District Cost Engineering Branch estimated crew support cost at $20 per person per day for seine and net vessels working the False Pass fishery in 2000.

[37] Crew shares including the captain are based on 50% of gross harvest value at a harvest level equivalent to a break-even operation for the year.

[38] Variable costs are those costs that are incurred because the vessel is in operation. Some management costs are fixed while others are considered to be variable.

[39] $1.30 average marine diesel cost at Kodiak for 12 months prior to Appendix preparation, from PSMFC database accessible at http://www.psmfc.org/efin/docs/2002FuelPriceReport.pdf. Season consumption is based on 24 hours with half at low power settings.

[40] Annual vessel, machinery, and maintenance, was estimated at 9.5% of vessel value as a reasonable range midpoint (8% - 11%). Includes an allowance for the hourly equivalent of overhaul cost and routine maintenance (lube, oil, filters, parts, labor). A study of Alaska fishers, by The Research Group in 1999 tabulated a range of 8% - 20% depending on vessel type. Longline and pot fishers were near the low end of the range and they are more typical of the Kodiak fleet. Alaska District Cost Engineering Branch estimates for the False Pass report in 2000 show the annual cost at 11% of vessel value.

Table 9. Hourly Harvest Cost Summary (Hourly Operating Cost)

	58 ft	45 ft	32	22
Season Fuel Cost Averaged per Hour Harvesting[41]	$42.36	$42.36	$21.19	$12.38
Season Fuel Cost Averaged per Hour for all Activities	$24.71	$24.71	$12.36	$7.22
Variable Repair and Maintenance	$17.52	$7.47	$3.81	$3.81
Hourly Fuel, Repair, Maintenance Cost	$60 High[42]	$50 High	$25 High	$16 High
	$42 Low[43]	$32 Low	$16 Low	$11 Low
	$51 Mid Range	$42 Mid Range	$20 Mid Range	$13 Mid Range
Total Hourly Including Fixed Cost and Crew[44]	$210 High	$146 High	$74 High	$52 High
	$123 Low	$85 Low	$43 Low	$31 Low
	$166 mid range	$115 mid range	$58 Mid Range	$41 Mid Range

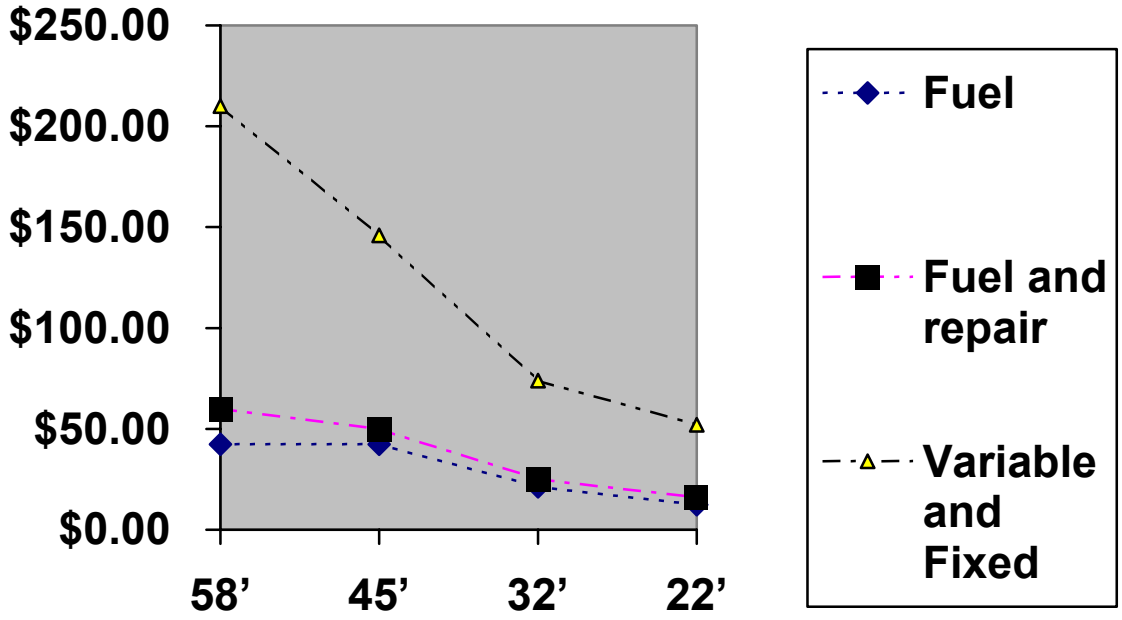
[41] Diesel at $1.30 is based on the average price of actual sales at Kodiak for the period January 2000 – July 2001 and an average of Kodiak plus 10 other Western Alaska ports from 2000 thru 2002. Taxes are excluded.

[42] Total season fuel cost averaged over just the hours spent harvesting.

[43] Total season fuel cost averaged over all hours in the season.

[44] Crew cost in the Alaska waters for relevant fisheries is based on a share of the catch using formulas unique to specific vessels. A general review of several crew arrangements indicates a 50% rule of thumb. About 50% of the harvest value is paid to the crew and 50% is used to cover vessel cost. There is an identifiable harvest level (value) needed to break even, and this level of harvest will have a specified amount as the crew share. The break-even harvest level is used to estimate crew share in the table.

HIGH RANGE HOURLY COST



5.0 BENEFIT EVALUATION

5.1 Assumptions and Methodology

In connection with this economic study, the site was visited during July 29 - August 5, 2001. The main purpose of the visit was to view the existing conditions and to assess community needs relative to local navigation problems. The visit involved seeking information related to harbor use, vessel and facility damage, and verification of study assumptions with local sources through Focus Groups. A related purpose of the visit was to validate "with–project" and "without-project" scenarios regarding an economic evaluation of harbor problems. In addition to one-on-one interviews and Focus Group meetings the field visit included an over-flight of Kodiak Island and a daylong area reconnaissance of alternative moorage and anchorage areas by boat. During the field visit, assumptions related to the needs assessment and proposed methodology were validated as follows:

- It was-assumed that commercial fishers, charter operators, and others will function in natural resource related activities in a way that maximizes net annual income among risk-equivalent, capital-equivalent, and life style equivalent choices available to them within their chosen fields. It was found that people do not live at Port Lions because of quantifiable economic reasons and that they make the choice to live there based largely on consideration of intangibles. Nevertheless, maximization of income is important to them if it does not adversely affect their quality of life.

- The boat harbor was assumed to be indispensable to survival of the community. It was stated as being the "heart of the community" by commercial fishers, city officials, lodge operators, and visiting vacationers.

- A preliminary assumption was that leisure time given up by local fishing industry workers for emergency work at the harbor could be valued at one-third the hourly income of all fishers estimated using available data sources, about $4.80 / hr[45]. This however was not verified as the City and Harbormaster find it necessary to pay a minimum wage of $14.66 per hour to attract unskilled temporary harbor workers from the ranks of locally unemployed.

- It was assumed that vessels, which would be relocated to Port Lions in the with-project condition, would have an impact on an alternative port's congestion, crowding, and delay. Specific data did not surface and such effects are believed to be insignificant to a benefit cost analysis of Port Lions. Loss of moorage fees at alternative harbors will be treated as a regional transfer.

---

[45] Pacific States Marine Fisheries Commission, Average Wages for Fishers, reported on the Economics Data Website<< http://www.psmfc.org/efin/data/wage_serdesc.pdf>>. Average monthly earnings are $2,190 but hours are unknown. Assuming 1,820 hours in a year = $14.44 / hr.

- Reduced shipping cost (navigation transportation savings) or other affects on the commercial transportation system will be evaluated using long-run cost.[46] Field investigation of transportation related problems indicated that water taxi service is a substitute for air travel during periods of inclement weather.

- It was assumed that benefits methodology related to reduction of vessel damages would recognize potential affects on vessel value. Field discussions verified that such value effects might deviate significantly from short-run out of pocket cost because typically not all damages are repaired annually, especially those constituting minor cosmetic damage.

- It was assumed that slips at Port Lions would be in use if regional wait lists contain an adequate number of commercial vessels to fill them; and if moorage at Port Lions is a positive net income choice of locations for commercial fishers. Consensus of all persons interviewed was that the harbor would fill up immediately if it can be made to provide safe moorage conditions and that based on frequent inquiries it could attract customers from Kodiak and Homer. Wait lists were verified as supporting expectations.

- It was assumed that damages to harbor facilities can be reasonably estimated based on repair records and cost of replacement-in-kind at present day standards. It was found that data on repair costs is available but that the emergency repairs done each year were under severe budget limitations and did not restore the project to the original condition hence the full economic loss is not accounted for in the repair cost.

5.2 Focus Groups

The field procedure for gathering information involved three separate Focus Groups recruited with help from several individuals within the community. The Focus Group approach was preferred as a cost-effective means of gathering community-based information related to qualitative aspects of harbor use; and also proved to be a convenient means of verifying study assumptions. A larger number of Focus Groups was originally planned but on the scene it was discovered that many of the participants held overlapping roles thus giving a lack of clarity to group characterization with more than three groups.

Focus Groups involve interviewing a number of people at the same time, the emphasis being on a dialogue of questions and responses between the researcher and all of the participants. Focus Groups rely on interaction within the group based on topics that are supplied by the interviewer. Hence the key characteristic of Focus Groups is the insight and data produced among all of the participants by the interaction between participants. The sessions are structured in a way that individual participants have a specific experience or qualification about the topic under investigation. An explicit discussion guide is used and the subjective experiences of participants are explored in relation to predetermined research issues.

---

[46] "Long run cost" is commonly used in the transportation industry to express cost per hour or per mile. It includes the hourly equivalent of capital and other fixed costs in addition to variable costs whereas "short run costs" include only variable costs. Long run cost is the appropriate opportunity cost and is consistent with evaluation of navigation savings as described in Principles and Guidelines. The Corps EGM data for evaluation of water transportation uses long-run cost.

The main purpose of Focus Group research is to draw upon respondents' attitudes, feelings, beliefs, experiences, and reactions in a way in which would not be feasible using other methods such as observation, exclusive one-to-one interviewing, or questionnaire surveys. These attitudes, feelings and beliefs may be partially independent of a group or its social setting, but are more likely to be revealed via the social gathering and the interaction which being in a Focus Group entails. Compared to individual interviews, which aim to obtain individual attitudes, beliefs and feelings, Focus Groups elicit a multiplicity of views within a group context.

Compared to observation, a Focus Group enables the researcher to gain a larger amount of information in a shorter period of time. Observational methods tend to depend on waiting for things to happen such as waiting for a given number of vessels to use a harbor or waiting for specific weather conditions; whereas with a Focus Group the researcher follows an interview guide and makes no event observations and applies no statistical procedures. In this sense, focus groups are not natural but organized events and provide subjective comments and therefore cannot be used to generate a statistical analysis or inference. Focus groups are particularly useful when there are power differences between the participants and decision-makers, when the everyday life of particular groups is of interest, and when one wants to explore the degree of consensus on a given topic.

Focus Groups are limited in terms of their ability to generalize findings to a whole population because of the relatively small numbers of people participating and the likelihood that the participants will not be a representative sample. Nonetheless, the decision to use Focus Groups was consistent with funding limitations, time restraints, the small size of the community and the sampling problems that would produce for a statistical questionnaire; and the fact that community-based information was considered to be important. The community is small and isolated, and a factor further complicating data gathering is that many non-local users of the harbor that would have been targeted by a questionnaire would be at distant fishing sites much of the year or living in other communities. If the present harbor users are to be considered as the population to be sampled (55 regular users during the summer), and a 5% error with a 95% confidence interval is stipulated this would require at least 48 returns, a target return level which was not considered to be achievable. Boosting the acceptable error to 10% would still require at least 35 returns but basing a statistical analysis on a sample size of 35 could introduce other problems.

Consideration was given to expansion of the sample to all of the 220 local persons as an alternative. At standard return rates, a 100%, one-time mailing without return incentives, would probably return a culled sample too small for statistically verifiable methods to be applied. Another concern was that the seasonality of the population could result in questionnaires arriving at a time when knowledgeable persons were not available to respond thus building a bias into the survey by removing qualified persons from the population surveyed. A third strategy would have been to attempt a statistical analysis via a questionnaire targeting all fishers registering fish tickets in the KMA. Fishers have a transitory life style in the sense that they are away fishing part of the year and might not receive mail sent to a "home port" or "home address" during that that period. This transitory characteristic indicates that a mail out questionnaire would probably not be able to be accompanied with an interview to verify the respondents understanding and interpretation of the instrument or to qualify the individual. This could be worked around by conducting a pre

questionnaire interview and post questionnaire follow up interview and expanding the study schedule to allow the process to work but the cost of such a survey would most likely exceed the study cost for the entire economic analysis without providing data any more appropriate than that which could be obtained using the faster and lower cost Focus Group method.

Verification of harbor problems and clarification of other related "without-project" conditions were the prime purposes of the Focus Group interviews that were conducted at Port Lions, and Kodiak. In addition to Focus groups there were other individual interviews conducted at Kodiak, Port Lions, and Anchorage. Some of the interviews were an informal conversational one-on one meeting in the work place. The Focus Groups were constructed around three subject areas:

Fishing and Harbor Related Activities - The group includes commercial fishers who had a personal history of harvesting in the vicinity of Port Lions or who had a directly related business.

Moorage Demand - The group includes harbor workers, owners or employees and customers of established reputable businesses at Port Lions and local government employees (Lodge owner, guide, water taxi, Harbormaster, City Clerk, Asst Mayor, etc.).

Damages - The group includes State and Federal government officials providing it had information, authority, or responsibility, related directly to solving navigation problems at Port Lions. Locally the group includes harbor users.

Having defined the Focus Groups, it was found that some individuals had backgrounds, which overlapped more than one area of expertise. An example would be Kevin Adkins, who as Mayor of Port Lions is a member of the local Government and as a big game guide; he is also a member of the hospitality industry and is also a water taxi operator. Due to availability problems Mayor Adkins was interviewed individually at his residence.

There was a call ahead announcement of the planned site visit and pre-meeting telephone conversations were held with the Harbormasters at Kodiak and Port Lions, Mayor's Office, two charter outfits, one commercial fisher, one wilderness lodge and staff members at the Corps of Engineers and ADOT. During the on site visit, charter operators, commercial fishers, government officials, and hospitality workers at Port Lions and Kodiak were talked to. The Anchorage interviews gathered data from staff at ADOT&PF, and the Corps of Engineers.

Each focus group was presented with a frame of reference read from a discussion guide (see Exhibit 5) and there was no formal questionnaire. Statistical data was not the objective of any of the meetings. Discussion guides are included in this report as Exhibits 2, 3 and 4 at the end of the Appendix.

Documented information consists of field notes capturing the main threads of each conversation including each individual's name, user status, means of contact, and a summary of relevant comments. The facilitator/analyst had a list of subjects to guide the interview. Meetings were followed up with a back check, for purposes of verification. There were numerous other casual conversations with persons not considered to be within a Focus Group. Interviews varied from short casual conversations with individuals to extended group sessions involving 3 – 6 individuals.

Table 10. Field Contacts

Name	Status	Contact
Elaine Sealock	Corps Economist	907 753 2621
Ruth Carter	State, Coastal Engineer	907 753 6230
Penni Johnson	Kodiak Harbor Admin	Pjohnson@City.Kodiak.Ak.Us
Lon White	Kodiak Deputy Hm and Salvage Diver	Lwhite@City.Kodiak.Ak.Us
Marty Owen	Kodiak Hm And Commercial Fisher	Mowen@City.Kodiak.Ak.Us
Steve Andresen	Port Lions Charter Operator and Lodge Owner	907 454 2467
Pete Squartzoff	Port Lions Charter Operator, and Water Taxi Operator	907 454 2333
Kevin Adkins	Port Lions Mayor, Charter Operator, and Water Taxi Operator	907 454 2481
John Nelson	Port Lions Commercial Fisher	Fv Outfox
Theodore Squartzoff	Commercial Set Net Fisher With 6 Crew	Set Net Site Narrow Strait
Ellen Griggs	Net Maker/Fisher Family	907 454 2315
Russell Gundersen	Port Lions Harbormaster	907 454 2227
Evelyn Mullan	Port Lions Administrator and Commercial Fisher	907 454 2332
Wayne Lukin	Port Lions Deputy Mayor	907 454 2267
Deeny Bartleson	Wilderness Lodge Staff	907 454 2341
Fred Komisky	Wilderness Lodge Owner and Charter Operator	907 454 2341
Norb Ruff and 5 Visiting Sportsmen	Repeat Adventurers From Michigan	C/O Fred Komisky 907 454 2341 Or Scott Phelps 907 454 2465

6.0 BENEFIT CATEGORIES

A principal purpose of this study is to quantify the economic merits of improving the Port Lions harbor by evaluating present and future economic losses that can be recovered by correcting harbor related problems. These losses include direct damages to vessels and the harbor itself, and other economic effects more directly related to harvest activities. To some extent, the effects include net income gains to fishers that are not able to use the harbor now but would use it if it were to be improved while other benefits accrue to those presently using the harbor.

6.1 Preventable Marina Damage

During this study, field discussions verified that existing users occupy the safest moorage within the harbor. This agrees with indications that the storm-damaged docks including those, which are now in-place but are unusable, and those which have been removed plus presently empty slips; are the locations where historic damages have been the highest. There is a consensus that 65 of the originally constructed 100 slips (planned 124 boat capacity) could not have been occupied year around because of wave conditions that became evident the first year after the harbor was constructed. Many original marina tenants permanently vacated for that reason. At the time of this report about 20 of the slips are acceptable for use during summertime periods of fair weather, and an additional 35 are useable year around.

The analysis of damage to float facilities and vessels was developed using information from persons experiencing damage and from those repairing it. This information was augmented by anecdotal information and reports noted in industry journals, and from secondary information gathered through interviews. The interviews focused on damages to the harbor facilities, to commercial/fisher/charter users of harbor facilities, to vessels damaged directly, to vessels damaged indirectly, and other effects. This attempt to focus interviews separately on various aspects of the damage history was intended for the purpose of getting beyond broad, general statements. The damage related information was followed by a back check for verification.

The original harbor project was authorized 14 July 1960 in PL 86-645 as amended. The Office of the Chief of Engineers approved a modified project 9 April 1979. The modified project provides for a north breakwater 600 feet long and a stub breakwater 170 feet long to protect a 5-acre mooring basin having an anticipated capacity of 124 boats.

Construction was started in March of 1981 and completed in the fall of 1983. A storm in November of 1981 caused extensive damage to the breakwater and repair to the breakwater cost $3,749,500 in 1982 prices. Using the US Department of Commerce Bureau of Economic Analysis GNP deflator[47] this amount of money in 1982 would have a present day purchasing value equivalent to $6,336,700. This expense is treated as part of the cost of the original project in this analysis, and has no bearing on costs that could be prevented by

[47] Accessible at <<http://www.usc.edu/schools/sppd/research/casden/res>> Use of the Civil Works Construction Cost Index(CWCCI) for breakwaters and seawalls in the Corps EM 1110-2-1304 would yield a 2002 cost of $6,192,000.

proposed improvements at Port Lions. The cost is considered to be irrelevant to the benefits of the proposed project, as it is understood to be nonrecurring; and unpreventable in the event that it does recur.

The GNP deflator was selected as the preferred index tool because it does not depend on a fixed set of goods and services and therefore incorporates an implicit adjustment for changes in technology and consumer/end-user substitutes. Such changes are an important consideration over a 20-year period of index adjustments and are not captured totally by the Corps CWCCI, which uses standardized indices for feature codes. The CWCCI would be more appropriate to estimate the cost of doing exactly the same work today as was done in 1982 and this is generally how it is used. However, evolution of knowledge, techniques, prices of components, etc. might lead to changes in the specific details of what was done in 1982 making a price indexed cost estimate inaccurate and misleading. In contrast the valuation used in the benefit calculation needs to represent the value of purchasing power that was given up in 1982 and its estimated equivalent today.

In addition to the above repair of major damage immediately after construction, one of the records on the project [48]indicates that during the 16 years from 1982 to 1998 an additional $1,821,073 (unadjusted for price level) had been incurred for maintenance. The actual amount spent in each year is not available, however if one assumes a midpoint expenditure for purposes of estimating price level effects the equivalent amount of purchasing power in 2002 to 2003 would be approximately $2,331,900. The nature of these expenses as breakwater maintenance disqualifies them from being put into the benefit evaluation unless they can be shown as maintenance expense typical of that which would be preventable by the proposed improvements. Since breakwaters are generally designed to last 20 years[49] or longer before requiring major maintenance, it is therefore appropriate that all of the $2,331,900 cost is included within the preventable category. Having this extent of unanticipated maintenance cost during the first 20 years of the economic life of the project is one reason why its performance is being studied. It is intended that such damages will be preventable when the project is modified.

In addition to the above federal maintenance of the breakwater there has been a continual local and state effort to maintain and repair the float system. Notable among the annual expenditures was a major reconstruction of the floats in 1989 at a cost of $500,000 equivalent to about $625,000 in present day purchasing power.

Every year since the project was reconstructed there has been serious damage to the moorage facilities. Despite annual repair efforts, the repeated damage has resulted in 65 of the originally installed 100 slips (124 slips planned) being unserviceable. The breakwater itself has withstood the winter storms but the area it is supposed to protect has proven to be extremely rough with waves reported by local sources to have been as much as 6 feet and

---

[48] 2000 Project Index Maps, Alaska District Corps of Engineers

[49] Detailed Project Report Supplement, Port Lions Alaska, Navigation Improvement for Small Boat Basin, Alaska District Corps of Engineers, December 1978

calculated at 8 ft in a Waterways Experiment Station fetch limited wave hindcast[50]. The 6-ft estimate is an observed wave activity in the winter of 2000, which exposed the bottom of a floating breakwater to daylight. Local sources claim the harbor is subject to ravages of serious storms many times each winter.

When local winds approach 25 knots the harbormaster calls all of the harbor tenants to tend their vessels. This is a necessary call, and the boat owners appreciate it because each year there is serious damage to the docks and the vessels would be in danger if not attended to. Movement of the floating docks causes the docks themselves to come loose from their anchor system and causes some vessels to break their lines, bang against the docks and chafe at their fender systems. When there is an inadequate emergency turnout or when the emergency team is not able to attend to all of the problems, residents have had to organize salvage operations to retrieve and repair vessels or docks after a storm subsides.

Because of repeated storm damage, at least 30% of the finger pier concrete dock has been damaged beyond repair and has been permanently removed from the water. None of it can be salvaged. About 50% of the remainder, which was in place as of the summer of 2001, showed serious damage. According to a statement by the Harbormaster, supported by the State of Alaska Department of Transportation, damaged sections cannot be expected to last.

Repair of the dock units is being planned by the State in a two-stage operation and it is estimated that the work will cost $65,000 for stage 1 and $1,031,900 for stage 2[51]. The State's repair estimate "for inner harbor facilities" at $1,096,900 is greater than the $672,000 line item in the Corps cost estimate because the Corps line item separates cost of mob, demob, preparation, relocation of the floating breakwater, PED, S&A and interest during construction all of which would be part of the inner harbor facilities cost when presented as a stand-alone project. If cost of the two inner harbor estimates is compared on a like basis where the data formats allow the numbers to be identified (contingency, relocation of the floating breakwater, and a pro rated share of mob and demob) they are $828,000 for the State and $829,000 for the Corps. The State's plan for repair will temporarily mend part of the damage and make part of the project reasonably safe and reasonably useable. An important condition of the work is that it can only be considered to be a temporary fix unless the breakwater is also modified to prevent the moorage facility and boats from being damaged in the coming winter storms. If the breakwater is modified to protect the floats, the investment will be protected against loss.

The State's estimated repair cost is $1,096,900 as a stand-alone project. This is in addition to a $500,000 effort in 1989, which would be $625,000 when adjusted from 1989 to present day purchasing power for a total of $1,721,900. It is presumed that the project history is a reasonable basis for annualizing costs and that the cost as annualized over the 19 years of record is a reasonable indication of average annual cost that could be expected over the next 50 years as well.

---

[50] Port Lions Small Boat Harbor Breakwater Repair Letter Report No 1, Alaska District Corps of Engineers, 25 June 1982.

[51] State of Alaska Department of Transportation and Public Facilities, Personal communication August 1, 2001

Table 11. Preventable Maintenance

Expense	Amount	Time	Present Value
Unanticipated O&M	$2,331,900	16 Years	$1,320,000
Float Repair	$625,000	6th Year	$443,700
Existing Damage	$1,096,900	19 Years	$370,800
Total			$2,134,500

Given the above $2,134,500 present worth of preventable damage and using the project life to date (at the time of this study in 2003) as the basis for amortization (19 Years) with a 5 7/8% discount rate, the equivalent annual value is $189,400. Actually, this is probably somewhat of an understatement because the harbor reached this state of advanced deterioration several years ago. It continued to accumulate some residual damage each year because of lack of resources needed to repair it completely and local efforts were only able to apply a temporary repair to the worst problems.

A case could be made that it should have been the subject of major repair and rehabilitation before late 1995. This timing is supported by condition reports and results of inspections and observations during remedial work following damage from the winter of 1994 to 95. Given a 12-year amortization, the annual equivalent would be $252,900.

6.2 Local Emergency Cost

The community has been performing maintenance on the harbor but they are not adequately funded to keep up with the annual damages. Their total harbor-operating budget is approximately $36,000[52]. In addition to the budgeted amount a great deal of unpaid labor is required in order to maintain the system even in its underdeveloped state. The NED value of uncompensated time and materials, which could be saved with a new breakwater, is based on the fact that local labor cannot be hired for less than $14.00 per hour. A detailed certifiable account of unpaid labor is unavailable however individuals and Focus Groups participating in this study estimated ranges. All of the estimates were qualified with comments to the effect that the harbor is the heart of the community and its lifeline, and without it they would not be able to live at Port Lions. They regard the local people as willing to donate as much time as necessary for emergency action needed to protect their way of life and preserve the harbor.

Based on numerous discussions with harbor users and local officials, there have been 15 to 20 storm events each year requiring some level of emergency action involving from 4 to 11 persons for 6 to 8 hours each day depending on severity of the event. By local accounts, the storm events generally last 2 to 3 days. In different years the annual NED economic cost of unpaid labor ranges from a low range of $25,200 to a high range of $184,700, using $14.00 for an imputed labor value and a labor cost multiplier of 2.5. The average would be $104,900. The labor multiplier is applied to the direct hourly labor cost to include payroll burden, fringe, supervision, overhead, materials, and administration. If one applies leisure

[52] City of Port Lions Harbor Department budget 2001, Resolution 01-03-R is $36,800. This does not include donated time and material.

time loss arguments using an administratively set time value at one third of the earning rate ($26.18 / 3 = $8.73)[53]; the range in value of donated labor is $15,600 to $114,500 for an average of $65,000.

In this report the estimated economic value of the donated emergency cost is based on using labor valued at $14.00 per hour plus the labor multiplier because this is the actual direct labor cost of paid labor at the site up to the limit of the community budget. Also the administrative formula set at one third the earning rate fails to recognize that the real value of labor whether donated or compensated has related administrative and overhead costs which are usually greater than the amount of hourly compensation to the employee.

For a benefit calculation using opportunity cost principles, an average of the high and low labor value would be used ($104,900) and to this would be added the emergency paid labor ($18,100) for a total of $136,500. However, pending development of detailed agency guidance on valuing unpaid labor; opportunity cost has been set aside in favor of present agency policy to use a direct financial measure. Compliance with this policy reduces the benefit to $18,100.[54]

6.3 Damage to skiffs

The list of moorage customers examined in the summer of 2001 included 55 boats, which was typical of moorage activity during recent summer seasons. Seven of them are skiffs under 20 ft that could be left in the water if the moorage area were safe and secure during storm conditions but they are hauled out in advance of bad weather because of fear of damage or sinking at the moorage. The haul out requires use of a trailer and a steep sloping gravel beach. There is no protected concrete ramp, nor is there adequate parking for staging of trailers. There is no haul out crane, travel lift, truck or trailer available for hire at the marina.

There are about 20 other skiffs stored on trailers in the vicinity of Port Lions. They are all occasional users of the marina although they are not renters of permanent moorage. They are usually launched, used, and then removed from the water as the weather demands. Depending on the wind direction, they may be launched from a public beach area near Port Wakefield, or at the marina. If the marina had adequate protected moorage the boats could be left in the water saving the launch and retrieval time and related wear and tear on boat, trailer, and vehicle.

Because the Port Lions small boat harbor ramp is not serviceable in all weather conditions, the haul out itself can cause damage to the vessel, trailer, and tow vehicle. Storms develop quickly and if the skiff owner wants to haul a vessel after the wind has come up he may be unable to do so. When that happens he must stay with the vessel for the duration of the storm to make sure it does not break its lines, bang against the dock, or pull loose from the

---

[53] Average earnings at Port Lions are derived from State data accessible at <http://www.dced.state.ak.us/cbd/commdb/CF_BLOCK.cfm> as follows: Per capita income $17,492 x population 256 / employment 91/ labor hours in a year 1880 / leisure time adjustment 3 = $8.73

[54] Direct cost of harbor emergency expense based on out-of-pocket cost.

moorage. If he is fortunate to have been able to tie the boat within the small part of the moorage facility that is sheltered by the breakwater he will be able to get to it safely to check its lines. If the boat has to be tied at one of the high risk slips it may not be accessible due to tossing and shifting motion of the dock. If this is the case the skiff is sure to experience broken lines, scuffs, probably broken deck hardware, and maybe loss of the vessel by having it sunk at the moorage, blown ashore or into another vessel causing damage to both. Annual skiff damages directly related to the rough moorage conditions are:

Table 12. Annual Skiff Damage

		Low	High
Line Replacement	$55 x 27 skiffs	0	$1,500
Cleat Related Damage	$300 x 2 - 4 skiffs	$600	$1,200
Scuffs, Scrapes	$1,500 x 3 - 5 skiffs	$4,500	$7,500
Impacts, Dents Scratches	$4,500 x 2 – 4 skiffs	$9,000	$18,000
Total		**$15,600**	**$28,200**

6.4 Beaching Damage

On some occasions, owners who are unable to haul out have made the choice of beaching their boat. Owners who make this choice are those who are unable to get one of the few well-protected moorage slips and are forced to take a lesser damage by running the boat onto the beach. They will take it under power toward the shallow end of the bay near the city and run it up on the rocky shore. They will pull it up over the rocks until it is above the high tide line if that is possible. Otherwise they will pull it up as far as possible and continue to retrieve it as the tide comes in to keep it out of the waves.

Available information indicates that the economic consequences of emergency grounding can be very high but applies to only a few boats each year. Experiences recounted included extreme cases of boats being swamped and those experiencing less severe damage related to bottom contact with the drive unit while the prop is engaged, and impact damage to the hull itself. In many other instances, the skiff is able to be driven up on the beach without incident. Since the database is very small and incidents vary widely, it has been assumed that over a long time span of many years damages related to emergency beaching will approximate those of vessels left at the harbor in relatively protected areas. Since there are only 6 to 12 such beaching events per year it is estimated that annual damages range from $3,500 to $12,500 [55] annually.

6.5 Large Vessels Set Adrift

There have been several such incidents of vessels that have broken loose and collided with others or blown ashore resulting in damage ranging from minor scratches to complete hull penetration and other major damage. One 32-ft fiberglass Chris Craft sport fisher damaged in a storm collision remains beached at the head of the bay. Before it was beached, it

[55] Average damage of $577 x 6 events for the low range and $1,044 x 12 events for the high range.

collided with a 28-ft Glaspar punching all the way through the fiberglass hull. It too broke its mooring but was retrieved before being blown ashore.

One boat was swamped by waves while tied in the marina and sank at its mooring. Others have been blown ashore and have been retrieved from the beach. The prevailing wind is from the open water so boats that break free are usually blown into the shallow end of the bay. If the tide happens to be out, the boat will end up on an exposed soft mud, sand, and weed bottom. Under such conditions damages are likely to be nil. If the tide is within two hours of high tide the beach will be made up of gravel with a few large boulders and some bedrock outcrops. The possibility of damage is higher under tide conditions that prevail about 33% of the time.

At or near Port Lions at least one vessel is grounded each year by storm conditions that cause them to break lines or cause them to pull cleats out of the deck or out of the dock. In some years, severe storms affect several vessels, but in any year, at least one vessel is expected to be affected. Though not always possible due to absentee ownership, or sea conditions, owners have adopted a practice of boarding the boats and securing them or moving them to other locations during storms. The crew tending the vessel will stay with it for the duration to keep the boat out of danger. On some occasions crews are not available, and on others crews have been unable to control the vessel.

Contacts with people actively involved in operation, repair and construction of boats typical of the Port Lions gill net and seine fleet developed several descriptions to account for a wide variation in damages resulting from grounding of anchored vessels. There are seven major factors:

- Absent owner
- Presence of rocks along the beach
- Wave direction relative to the shoreline
- Wave activity
- Wind velocity and storm duration
- Boat size
- Type of hull material

People with local knowledge of the area emphasized the first five variables. People having first hand experience with vessel repair and maintenance emphasized the sixth and seventh variables.

Typically the weather set leading to damage includes a fairly long duration storm from the northeast. When seas develop to a combination of swells and steep short interval waves, lines on the moored vessels become tight and eventually break or pull the cleat out of the dock or out of the hull. As vessels not under control are blown closer to the shoreline they are more subject to breaking waves so the shallower near shore water does not necessarily slow the advance onto the rocks. As the vessel is driven onto the beach it can be lifted and tossed about with each new wave until the storm subsides or the vessel is retrieved.

The amount of time that a vessel is grounded against the rocks is perhaps the single most significant factor in determining damage. Storm duration for 9 of the significant historical storm events used in WES wind hindcast studies was 4 days and one was 9 days. However the window of high tide that exposes the grounded vessels to a rocky shore is only 8 hours each day.

There is a known inverse correlation between wind velocity and wind duration and an assumed positive correlation[56] between extent of damage and storm severity. The assumption, which is derived from informal observations by residents who see the harbor daily, asserts an expectation of minor damage associated with annual events, serious damage associated with 2-year events, severe damage associated with 3-year events, and maximum damage associated with 4-year and greater events. Expected annual damage is the result of combining the severity and number of events with their expected frequency.

Damage scenarios were developed from discussions with repair yards and marine surveyors. Four levels of damages were identified for boats with fiberglass hulls and boats with aluminum hulls. For boats of similar size and intended use, hull material was determined to be the prime factor in damage variation between two vessels suffering the same circumstances. Damage scenarios are as follows:

Minor Damage, Fiberglass Hull - Deep paint scratches through the gel coat deep enough at small locations to expose the cloth, mat, or roving, above and below the waterline. Watertight integrity is maintained and mechanical systems are workable but in need of repair due to inboard/outboard (IO) stress and prop damage. For inboard (IB) vessels, shaft and strut or rudder damage is evident but the boat is able to be refloated and possibly can be moved under its own power. Repairs must be made before the boat can be used and a haul out is required prior to the boat being fully serviceable. Hull damage is not structural, but damages are obvious and must be repaired to assure watertight integrity of the fiberglass strands to prevent long-term water infiltration. Mechanical systems need repair, as they are not reliable as is. Damages are up to 15% of replacement cost.

Minor Damage, Aluminum Hull - Cosmetic scratches to hull. Damage to drive systems is similar to damages incurred by fiberglass boats. Damage is up to 5% of replacement cost.

Serious Damage, Fiberglass Hull - The fiberglass material is fractured or punctured but not displaced from the location of the damage. Damage below the waterline causes the boat to take on water when refloated but the pumps are able to keep up with the flow. The IO lower end damage does not result in a fracture of the castings but is visible. The IB shaft strut is fractured and displaced, as are the rudder and post. Both IO and IB drives will need prop replacement. The boat is towable when refloated, but needs a haul out and structural repair to the hull and drive system before being operable. Damages are 15% to 25% of replacement cost.

Serious Damage, Aluminum Hull - Hull scratches and dents are obvious but not large enough to impact vessel displacement, stability, or handling. Drive system damages are

---

[56] The relation between storm severity and vessel damage is somewhat intuitive although it is supported by anecdotal evidence but such information is from casual observations not statistically verifiable data. A coefficient of correlation is not available.

similar to those incurred by fiberglass boats but less serious as strut damage is less likely and damage to rudders is less extensive. The boat may be able to be moved using its own power, but the drive system will need an immediate repair for anything but emergency use. The hull will be serviceable without repair and haul out. Damages are 5% to 15% of replacement cost.

Severe Damage Fiberglass Hull - Fractures displace parts of the hull where it is damaged at points of repeated impact. The boat fills with water and wallows on the shore causing all mechanical systems and electronics to suffer water damage. The hull bottom receives major structural damage with possible though unlikely involvement of stringers. The boat cannot be moved or launched without emergency repair to make it towable. Extensive specialty fiberglass work is needed. Damage is 25% to 40% of replacement cost.

Severe Damage, Aluminum Hull - Hull dents will be significant enough to impact displacement and performance. The hull remains watertight even with damage incurred below the water line. The mechanical and electrical systems do not suffer water damage providing the boat remains upright during the grounding. Impact damage will render the drive unit unusable without major repair. The boat can be towed without repair but cannot be used. Damage is 15% to 30% of replacement cost.

Maximum Damage, Fiberglass Hull - Repeated impacts cause catastrophic failure of hull material, and/or deep water sinking. Fire may be associated with the loss. Some salvage may be possible however unlikely. Damage is 40% to100% of replacement cost. Damages can exceed replacement cost if environmental damages or negligence is involved.

Maximum Damage, Aluminum Hull - There is evidence of catastrophic hull damage, such as can be caused by being rolled in the surf onto a rocky shore. Hull displacement and stability are compromised through changes in the hull geometry. Mechanical and electrical systems suffer water and impact damage. Mechanical systems require replacement. Hull repair requires welded sections. Damages are 30% to 100% of replacement cost. Damages can exceed 100% if negligence or environmental damage is involved.

The expected percentage annual loss has been estimated using damages related to fiberglass and aluminum hulls as follows:

Table 13. Annual Loss Calculation

Damage Range	Frequency	Tide Condition	Avg % Damage	Freq of Interval	Weighted %
0 - 15%	.99	.33	7.5%	.01	.03
5 - 25%	.50	.33	15%	.49	2.4
15 - 40%	.33	.33	27.5%	.17	1.5
30 - 100%	.25	.33	65%	.08	1.72
				Total	5.65

Typically the larger vessels subject to grounding by storms are owned by absentees and are assumed to be a combination fishing boat in the 45- to 58-ft class. Typical replacement cost of the combination boats is in this size range would average about $239,500[57] so the

[57] Data developed for the Port Lions fleet as shown in Table 6

estimated annual expected loss from preventing large vessels from being set adrift with subsequent grounding damage is 5.65% x $239,500 = $13,500. Given that the purpose of the harbor is to prevent such losses by providing a safe year around moorage, the project will be able to prevent all damages to large vessels set adrift.

6.6 Replacement of Lines

The Port Lions skippers generally replace all lines every year although in many quiet moorage's, dock lines can be used for several years particularly for vessels not actively engaged in harvesting. The amount spent on new lines will vary with the size of the vessel. Lines for each of the 8 40- to 60-ft vessels can cost $500, for the 13 30- to 40-ft vessels the cost is $300, and for the 34 vessels under 30 ft the cost is $100 each for a total of $11,000 per year. The estimate is based in part on the following catalogue price of "Mega Braid" mooring lines and personal communications with operators at Port Lions.

Mega Braid is used on larger boats because its single braid construction coils and flakes more easily than large diameter 3-strand line; it's gentler on the hands and slightly lowers stretch than 3-strand, but extremely flexible and resistant to kinking. In the with-project condition the number of annual line replacements will be reduced by an estimated 50% to 80% yielding a benefit range of $5,500 to $8,800.

Table 14. Mooring Line Cost

Mooring Line	Cost
Mega Braid Dockln e, 1-1/4"X60'	$329.99
Mega Braid Dockln e, 1-1/4"X80'	$409.99
Mega Braid Dockline, 1"X50'	$164.99
Mega Braid Dockline, 1"X60'	$189.99
Mega Braid Dockline, 1"X50'	$199.99
Mega Braid Dockline, 1"X60'	$219.99

6.7 Damage to Cleats

If moorage lines do not break the shock is transferred to the vessel and to the dock causing failures at other points of the moorage arrangement. Such events lead to cleats breaking off or pulling out of the deck. Related to failure of deck cleats is damage to the surrounding mounting area. Consequences of these failures can involve major repair cost if aluminum welding or fiberglass repair is required. It is not unusual for repairs to vessels 30 ft and larger to range from $300 to $4,000. There are no local statistics kept on these events however personal communication with local sources solicited the opinion that it is reasonable to assume 2 such cases per year and that the cost could reasonably be assumed to range from $300 to $2,000 per event. With two events the annual damage is estimated to range from $600 to $4,000.

6.8 Vessel Tending

Storm tending of large vessels is required several times per year. The larger vessels sometimes require more than one person to secure the vessel, and they sometimes require

around the clock attention during storms of up to 9 days duration with durations of about 2 - 4 days being more common. For evaluating the economic aspects of vessel tending there is only an anecdotal database. It is nearly impossible to separate the time spent on watch of large vessels from other storm related response activities. For example, the time value associated with emergency activity at the marina related to protection of the dock system and protection of skiffs has already been estimated but there is a separate set of concerns related to safety of larger vessels. It appears there is a risk of double counting of economic costs if the time for caretakers of larger vessels is added to the total time related to securing the marina itself. Both sets of events are concurrent and if one is removed from a typical scenario the same number of people are likely to be involved in sacrifice of their time for the other event. The need for vessel tending is genuine however quantification of the economic value was not pursued because a separate estimate of effects would probably lead to some unidentifiable amount of double counting.

6.9 Vessel Damage at the Docks

Many vessels show visible damage from hulls rubbing against the docks or contact with other vessels. Overall the damage appears to be minor and some vessels show none at all. This is because most of the potential damage is prevented by the many hours of vessel tending that go on at the marina during storms. In addition, when damage is incurred it is repaired as soon as possible due to the need to provide charter customers with the visual assurance that vessels are well taken care of and sea worthy.

Even damage that appears to be a minor paint scratch can add up to a significant dollar amount when expressed in terms of impact on sale value. This is because when vessels are for sale they are expected to fetch a higher price if they are in "Bristol" or like new condition. Such reconditioning is very costly even if a vessel only shows minor blemishes. Vessel repair cost is very high because there is no repair yard facility at Port Lions. Subjects interviewed maintained that these cosmetic damages are generally a deferred or overlooked cost but owners are aware with certainty that they will eventually realize losses when vessels are sold if repairs are not made.

Contact with a marine detailer indicated that preparation for sale was primarily a process of detailing the vessel much the same way used cars are prepared for sale although at a much larger scale. A car can be detailed in a day or less while a 42-ft vessel can take a week or more. Even at the expense of a week long detailing effort the cost does not amount to enough to warrant continued investigation as the resulting benefit will not be great enough to influence the outcome of this economic study. Such preparation cost would be required in the with-project and without-project condition.

Vessel damages that have been allowed to accrue however generally become a major expense either to the seller or the buyer regardless of how complete the cosmetic detailing is. Such accrued damage is considered minor with regard to interference with safety and operation of the vessel but ordinarily reduce value by 5% to 15% of the value of a vessel in top condition. One way to estimate the economic cost of these damages is to have a marine surveyor or shipwright actually estimate the cost of repairing the damage. Since there is no repair facility or expert opinion available at Port Lions, this was not a practical solution. Alternatives are to bring an expert to the location or to find similar vessels with similar

damage at a location where an on site appraisal could take place. Interviews with four shipwrights at Port Townsend Washington which has a large concentration of repair facilities commonly used by Alaska fishers supported the 5% to 15% band as a reasonable estimate. It was pointed out that getting such a vessel into like new condition would exceed this range by a significant amount. Damages from deferred maintenance and repair often create conditions that lead to complications and major component failure. For that reason it is unreliable to generalize the relationship of deferred maintenance and vessel value except on a vessel-by-vessel basis. The 5% to 15% range should be considered a low range as yard bills commonly exceed this amount.

To varying extents, the damages are experienced by the entire 55-vessel fleet using the harbor during the harvest season in the without-project condition. The entire fleet is at risk and since storms happen several times a year, and since moorage customers tend to return year after year; damages that they experience could be compounded by a series of damaging events over time, even within the course of a year. Although damaging events happen at least annually it is clear that local emergency action provides self help that is effective at preventing as much as 80% of the annual damages. In the with-project condition, damages are preventable by proposed harbor improvements in the sense that the wave events causing the damage are controlled. Using 5% of the fleet value as an estimate of preventable accrued damages in the without-project condition, the annualized deferred repair amounts to $3,400 ($5,920,800 without-project fleet value x .2 damaged annually x 5% value factor x .0580 50-year A&I = $3,400) and at 15% it amounts to $10,300, an average of $6,800.

6.10 Reduction in Harvest Cost

Because of the unmet regional demand for moorage, and the proximity to the fishing grounds, a properly functioning breakwater would result in all124 of the slips being rented to fishers. In contrast to this, the without-project condition would accommodate only 35 vessels.

Documentation of the economic advantage of the location of Port Lions is fundamental to assertions that moorage at Port Lions can reduce fleet operating costs. To that end information from the ADF&G database and the CFEC database for the 1990 to 2000 decade was used to determine that on a yearly basis an average of 462 fishers did salmon fishing closer to Port Lions than to Kodiak. Proximity to the fishing grounds is a major economic factor in determining the economic advantage of a given port.

Using the relevant active fleet, data from the ADF&G database was used to find identifying information on each vessel and information relating to harvest, harvest value, and harvest location. The database presents spatial information by regulatory areas broken down into District, Section, and Statistical Area within the greater Kodiak Management Area. The Statistical Areas are the smallest unit and some of the Statistical Areas are so small that in some years less than four vessels are active within them indicating a high degree of precision and relevance of the data.

Through the ADF&G database relevant to the KMA, the 10-year average harvest was determined for each of 98 ADF&G statistical areas out to three miles from shore. The database was also sorted to identify the number of Kodiak based salmon fishers that operated

in each Statistical Area. This gave a basis for mapping the average annual number of vessels harvesting at different distances from the two ports.

The popular harvest area for the Kodiak based salmon fleet is the salt-water area surrounding Kodiak Island and Afognak Island to three miles offshore. Of the 98 Statistical Areas, 74 of them are closer to Port Lions than they are to Kodiak. Based on historic harvest data, the 74 Statistical Areas account for 75% of the salmon harvest, and a reported 75.4% of the fleet activity. Among the 469 salmon vessels now using Kodiak Harbor this would indicate up to 352 could be closer to the fishing grounds if they were to use the harbor at Port lions instead of using Kodiak Harbor.

Realistically only about 60% to 80% (average of 73%) of the salmon vessels registered for a KMA salmon net area (Kodiak based and other) actually fished commercially during the 1990 to 2000 years. During the most recent 3 years this average has dropped to 64%.

In a given year the fishers in the KMA can include a huge number originating from homeports beyond Kodiak Island. Most of the outsiders come to the area from the Alaska Peninsula and from the Kenai, making up a yearly average harvest fleet in the KMA of around 616 vessels. The number 616 was derived by dividing the average harvest per vessel from the CFEC database into the KMA harvest to estimate the average number of vessels at 616. Statistical area charts showing the harvest location of vessels indicate that when non-Kodiak home-ported vessels are included there are 462 vessels that harvest closer to Port Lions than to Kodiak.

Therefore, of the 89 vessels that could relocate to new slips at Port Lions from virtually any other location (based on improved moorage space that could be provided in a with-project condition) virtually all of them would enjoy an economic advantage of being closer to the fishing grounds. Logically, those, which would enjoy the largest increase in net income by operating out of Port Lions, would be among the first to relocate. It is clear that the 89 vacancies would be filled from the 462 potential cost savers well before running out of net income beneficiaries.

The advantage of a location closer to the fishing grounds is that it reduces the harvest cost by reducing the number of hours spent in transit between the fishing grounds and a harbor. This travel cost is especially important due to the Alaska fishing regulations, which open and close various fishing locations at 2- to 4-day intervals during the June through September salmon harvest. During the closures, vessels will either steam to another location where fishing is still open or anticipated to be open near the time of their arrival, or they will return to port. The practice among the Port Lions fleet is to return home. Anchoring near the fishing grounds is not a common practice for them because the trip back to port is generally only a half-day run or less, and anchoring exposes vessels to storms that they could otherwise escape plus it introduces the inconvenience of being away from home.

In this part of the benefit evaluation it is assumed that the incremental number of slips that would be protected at Port Lions is 89 and this serves to limit the number of vessels that could take advantage of the location. With contacts made through the United Fishermen of Alaska, telephone numbers of Kodiak based seine operators were obtained. Individuals' contacted described port calls by the users of Port Lions as being as frequent as every other

day or at each closure. Using records from 1999 to represent a typical year, there were 43 openings ranging from 6 hours to 81 hours. There were 47 openings in 2001.

To estimate the economic advantage that could be provided by restoration of Port Lions to its originally intended scale of operation, an increment of 89 Port Lions slips was assumed to contribute salmon season trip savings based on 43 openings = 3,827. Return trips were assumed to take place at half the closures x 89 vessels = 1,913 trips. Next this is adjusted downward by 5% to account for vessels under 23 ft, which would not be considered as serious salmon harvesters. It is also adjusted downward by an added 27% to account for vessels that might not be active harvesters during a particular opening. The 27% is derived based on a 10-year review of fishing activity by over 330 actual licensed vessels. Of those that were permitted to fish in a given year, there are about 27% of the vessels that are idle. The reasons for not actively harvesting are generally because it is difficult to find qualified, stable, reliable, experienced crew persons to work on a crew share basis and the fact that low fish prices discourage some permitted fishers from using their vessel for part or all of a season. These vessels represent a portion of the total fleet, which does not fish and remains in port in any salmon season opening. The probably net number of trip reductions estimated for the 89 slips is therefore 1,913 x .68 = 1,301.

Kodiak city harbor has about 85% of the total moorage space available on the island. For the fleet fishing north and west of Kodiak beyond Narrow Strait, or in the Shelikof Strait area, an alternative port at Port Lions would present them with a 3-hour shorter vessel trip to port between openings.

In the with-project condition, when not fishing, vessels could be moored at Port Lions and the crews wanting to go to Kodiak could be returned to Kodiak by water taxi via Anton Larson Bay. The water taxi service would add some time and cost but even with this cost included the net operating cost is lower than running the vessel back to Kodiak through Narrow Strait.

To estimate the range of economic savings, the estimated number of multiplied the vessel operating cost per hour hours saved. There is a range of savings depending on the vessel size, number of vessels involved, and vessel speed and weather conditions. The operating cost per hour was weighted by the percentage of vessels in each size class as follows:

Table 15. Weighted Average Hourly Cost With-Project Fleet

Size Class	Size Distribution	Low Range Hourly Cost	Low Weighted	Mid Range Hourly Cost	Mid Weighted	High Hourly Cost	High Weighted
Up to 22 ft	5%	$11	$1	$13	$1	$16	$1
23 to 36 ft	43%	$16	$7	$20	$9	$25	$11
37 to 54 ft	45%	$32	$14	$42	$19	$50	$23
55 to 58 ft	7%	$42	$3	$51	$4	$60	$4
Weighted Ave. Hourly Cost (rounded)			$25		$32		$38

The estimated savings using low range operating cost is 6 hours RT x $25 x 1,301 trips = $195,100 travel cost savings for the fleet. Nothing was included for saving related to leisure time recovery.

For a higher range estimate, the number of vessels participating was increased to 80% and return trips were assumed to take place at each closure so, 89 vessels x.80 participation rate x 43 closures = 3,062. The high range estimate recognizes three participation factors:

- Generally vessels relocating to Port Lions will do so only to take advantage of harvest activities from there. The location provides no incentive to prospective customers if they are not active fishers. Therefore the prospects of a salmon vessel relocating there and then not fishing are nil. Participation rates among salmon fishers home ported at Port Lions will approach 100%.

- A positive competitive business environment after the last 10 years during which there has been a continued squeeze on the profitability of salmon fishing. Over the period there has been a trend to fewer vessels exercising permits and many factors have combined to erode profits. Among the factors are foreign competition, high operating cost, increased regulations, and an aging fleet. Those vessels, which remain are becoming fishers of other species in addition to salmon, and are becoming year around harvesters introducing a new measure of economic stability. This income from other species will have the effect of stabilizing the number of harvesters by supporting profitability. The current trend toward increased margins is from aggressive efforts to develop products for higher price niche markets while providing incentives for more efficient operations. Meanwhile the foreign competition is being faced with a new set of production problems and international marketing challenges. Operations out of Port Lions are likely to offer higher net incomes than any other KMA location.

- In 2003, Governor Frank H. Murkowski endorsed a $50 million state Salmon Industry Enhancement Strategy, aimed at an aggressive, international marketing program for wild Alaska salmon. The goal is to increase Alaska seafood quality or diversity, increase value for consumer products, increase processor harvesting and profitability, lower costs within industry, and or increase economic activity within communities. Plan success would contribute to higher profits and increased vessel participation.

Using an 80% participation rate results in 3,062 trips saved at 6 hours per trip and a high range weighted average fleet hourly cost of $38 for a travel cost savings of $698,100.

The savings resulting from taking the vessel to Port Lions instead of Kodiak is estimated to range from $195,100 to $698,100. From this, one needs to subtract crew water taxi service at $96[58] to Kodiak for an estimated third of the trips[59] amounting to $73,800 and $88,200 respectively. This expense is to allow for crew members desiring to make a short visit to Kodiak instead of taking advantage of accommodations aboard the vessel. ($96 x .33 x 89 vessels x 68% participation x 43 closures = $72,400; and $96 x.33 x 89 vessels x 80% x 43 closures =$97,000) leaving a range of net saving of ($195,100 - $72,400) = $122,700 to

[58] 23 '- 36' vessel without fishing gear at an hourly cost of $16.

[59] Many skippers because of the possibility that the crew will return late or not at all discourage crew trips to Kodiak. Crew unnecessary can obtain all necessary supplies at Port Lions from nearby tender vessels making salmon season visits to Kodiak. It is known that all 55 vessels using Port Lions in the without-project condition return there during closures.

($698,100 - $97,000) = $601,100 for the location advantage realized from expanded moorage capacity. The mid-range estimate is $361.900.

6.11 Water Taxi Service

In the without-project condition, moorage is inadequate to assure water taxi availability more than about once per week. This is because the few larger vessels that homeport at Port Lions will double as charter operators, and commercial fishers, and may be out fishing for days. In such cases, people weathered in at Port Lions due to unsuitable flying weather and without available water taxi service may wait several days for suitable flying conditions. This wait for safe flying conditions also involves passengers at Kodiak who are unable to get to Port Lions. For many stranded passengers the lost time is actually lost earnings not merely lost leisure time. Lost earnings appropriately measure the opportunity cost of lost time because quite often the stranding happens at the end of fishing or hunting vacation when the stranded passenger is trying to return to work.

A properly functioning breakwater would provide year around moorage for additional vessels thereby increasing the chances that a vessel would be available as a dedicated water taxi service. With a harbor there are two ways that goods are shipped into Port Lions from Kodiak by schedule or charter air service, and by water taxi. Reliable water taxi service will not develop if the breakwater is not improved and freight service will also be unreliable. Cost of shipping 2000 lbs. by air is $660 compared to costs as low as $96 - $360 by water taxi / land shuttle via Anton Larsen Bay, an average saving of about $430 per ton.

There is no Waterborne Commerce database kept that records freight and passenger shipments by water taxi because of the informality of the operation. Regular commercial cargo shipments by barge and ferry are documented but the operators who offer the taxi service do it as an unadvertised and incidental sideline to augment their charter business or commercial fishing. It is incidental to them, but it is also extremely important to the community because it can be without air service for days on end.

Having without-project information available on three of the local water taxi operations it was concluded that in the with-project condition the taxi operations could take place at least three times a week, year around. The trips are usually a mix of passenger and cargo. The residents of Port Lions prefer the water taxi to air travel and use it regularly. Three trips weekly, year-around are 156 trips per year. Each trip with 6 passengers saves $200 over the cost of air travel. With half the trips being for cargo at a saving of $430 per trip, and half for passengers with a saving of $200 per trip, the water taxi service provides a potential annual saving is $49,300.

6.12 Alternative Port Impacts

Modification of the breakwater and moorage area at Port Lions will add up to 89 well protected moorage slips to the Kodiak Island area. Because there is a shortage of protected moorage, vessels crowd into the protected harbors with crowding becoming excessive just before the salmon season opens and near the end of the season. It happens again during two months of mid winter when fishers of other species tend to avoid the worst of the winter

storms and traditionally take their holidays. Periodic crowding is also a problem when extended fishing closures happen during the May to September period.

At practically any Alaska harbor, after the slips are full additional customers raft together and this crowding leads to damages in the harbors as vessels come in contact with one another. Another concern is the inconvenience and lost time that happens when the rafts have to be reconfigured to accommodate arriving or departing vessels. For some marina operations, under-capacity has been a major complaint, and the basis for costly expansion plans. For others, it has been considered a way of assuring that there will not be a shortage of moorage customers. Some marina operators prefer a harbor with a wait list while the customers that use the over crowded harbor dread the inevitable frayed tempers, collisions, and inconvenience.

Modification of Port Lions will probably alleviate some of the wait list at Kodiak. To some extent, it will reduce crowding an over capacity use at Kodiak, Larsen Bay, Ouzinkie, Old Harbor, and Port Lions itself. If it eats into the wait list at Kodiak or other places too much, or if it causes Kodiak or others to lose customers there will be an adverse financial impact. This is not anticipated as a most likely future scenario; however local financial impacts related to loss of moorage revenue is a transfer, which balances increased moorage revenue at Port Lions. The reduction in damages and reduction of inconvenience due to alleviation of crowding however is beneficial NED effect. The beneficial NED effects on harbors other than Port Lions have not been evaluated in the interest of demonstrating that the proposed project can stand on its own.

6.13 Other Direct Benefits

The "other direct benefits" are those, which are incidental to the purpose of the project in the sense that the plan formulation pivots on the separable justification of higher priority NED benefits and costs. Because the NED Plan navigation improvements are justified on the merits of narrowly defined net income effects alone effects such as Subsistence, Harbor of Refuge, and Search and Rescue are incidental in the sense that they have no incremental cost. Transportation savings and other net income gains constitute annual benefits of $847,400 while other direct benefits are $153,000.

6.14 Subsistence Opportunity

In current Alaska and Federal law, subsistence is defined as customary and traditional, non-commercial uses of wild resources for a variety of purposes. The uses include harvest and processing of wild resources for food, clothing, fuel, transportation, construction, arts, crafts, sharing and customary trade. As such subsistence cuts across the native culture and is significant to survival well beyond basic food needs.

Alaska has a subsistence law because subsistence supports a major part of the State's economy and culture. Alaska is unique in this regard. Traditional cultures and economies co-exist with the industrial-capitalism of Alaska's urban centers. The slated intent of the Federal and State subsistence laws was to provide the opportunity for the traditional cultures and economies to co-exist.

Statewide, non-commercial fishing and hunting provided about 35 to 44 million lb. of food annually to rural areas during the 1980's. This comes to about 318 to 400 lb. per person a year or about a pound per person per day for the 110,000 subsistence users.

While subsistence is important to the native population, it represents a comparatively small portion of wild resources harvested annually in Alaska. In the salmon fishery, subsistence represents less than 1% of the total harvest. Of all fish and game harvested in the state less than 4% goes to subsistence. About 1% goes to sport use and 95% goes to commercial uses.

In rural areas, subsistence is part of a "mixed subsistence-market economy. This type of economy occurs in the Canadian north as well. In a mixed, subsistence-market economy fishing and hunting are central activities conducted by extended family groups. Subsistence is not oriented towards a market sale or accumulated profit, as is commercial production. Rather it is directed toward meeting the self-limiting needs of families and small communities.

Subsistence production is augmented and supported by cash employment of family members. Typically cash incomes are modest and seasonal. Families follow a strategy of using monetary earnings to capture and expand technology for producing food. This combination of subsistence and monetary activity characterizes the mixed subsistence-market economy that prevails at Port Lions. Monetary earnings are invested in marine equipment varying from skiffs to large combination boats, and in training to learn application of modern equipment to the subsistence life style.

Port Lions residents follow a seasonal harvest round based on historic use and resource availability, harvesting different resources throughout the year. Generally among the coastal rural villages most marine mammal harvests occur in the winter when the animals float better after being shot and hides are marketable, or in spring when new pups are available. Black bears are taken in the fall and spring. Summer is characterized by salmon and berry harvests. Locations of harvests are tied to access by boat.

There are two Technical Reports by ADF&G on the subject of subsistence at Port Lions. The reports used an interview procedure to determine the amount of subsistence use during 1983 and 1986. Subsistence hunting, fishing, and gathering are fundamental parts of the community economy, culture, and way of life and household participation in subsistence harvest is virtually universal. In 1987 the Division of Subsistence, Alaska Department of Fish and Game (ADFG) conducted a household survey of 211 households in six Kodiak Island Borough communities.[60] The survey reported harvest quantities, participation levels range of resource use, and salmon harvest by gear type. Per capita harvest quantities were consistent with findings for other small communities in southcentral and southwest Alaska.

The ADFG subsistence study referenced above was preceded by a similar study of the same communities in 1983. Harvests for Old harbor, Ouzinkie, and Port Lions (three communities with partially protected natural bights serving as small boat moorage) were similar in both surveys. Both studies were performed over a 12-month period. Results of the surveys

---

[60] James A Fall and Robert J Walker, Subsistence Harvests in Six Kodiak Island Borough Communities, 1986, Technical Paper 193, Division of Subsistence ADFG, June 1993. See also KANA 1983; ADF&G 1985a, 1985b; Schroeder et al 1987; Scott et al 1992, 1993.

showed that households in Port Lions and the other communities use relatively large quantities of subsistence resources, generally between 300 to 500 lbs. per capita per year. In terms of lbs. of edible weight, salmon contributed the most to subsistence harvests.

It is clear that villages like Port Lions which are at remote locations inaccessible by road and which have a large portion of the local population made up of Alaska Natives have a heavy reliance on gathering of wild foods. Practically all subsistence activities rely on the use of water transportation at least at one stage of the activity. Providing an all weather moorage serves to increase the usability of vessels for subsistence purposes.

Among five of the communities with available comparable data, there is a .62 correlation between total subsistence use and subsistence salmon harvest. This is taken as an indication that increases in ease of vessel access and use is related to better prospects for an increase in total subsistence takes. There is assumed to be a direct connection between number of subsistence expeditions and quantity of the subsistence harvest although the available studies provide no hard data on this relationship.

Availability of a harbor capable of protecting vessels used for subsistence harvests will make boats immediately available for increased subsistence use. Without an improved harbor some harvest trips will not be made because vessels will not be useable. Ability to depart and return to a sheltered harbor will extend the time available for harvesting thereby increasing the number of trips that can be made and also increasing distances that can be traveled. The effect of the harbor will be to enhance opportunities and increase subsistence harvest toward the ideal goal of self-reliance, which is a theoretical maximum that in practical terms may be undesirable and unattainable. A comparison with nine other rural coastal native villages (5 on Kodiak Island and 4 on PWS and Alaska Peninsula) revealed the following per capita subsistence harvests:

Table 16. Subsistence Harvest Among Nine Rural Alaska Maritime Villages

Village Name	Population Reported in 2000	Percent Native	Jobs	Population/Jobs Ratio	$ Per Capita Income	Lbs of Per Capita Subsistence Harvest [61]
Ugashik	11	82	4	0.36	12,500	814
Akhiok	80	94	30	0.38	8,500	582
Old Harbor	229	86	57	0.25	14,200	423
Ouzinkie	225	87	76	0.34	19,300	403
Egegik	116	77	21	0.18	16,300	385
Karluk	27	96	11	0.41	13,700	385
Pilot Point	100	86	48	0.48	12,600	384
Chenega Bay	86	78	33	0.38	13,400	378
Port Lions	256	64	91	0.48	17,500	333

Taking Ugashik as an example, the practical maximum harvest reasonable for Port Lions is no more than 814 lb. However the Ugashik economy offers some form of employment for

[61] Data in this column is from household surveys in 18=986 using 1986 population and harvest. Other data in the table is based on year 2000 US census

only 4 of its permanent population of 12 persons making subsistence activity there a more important part of survival than at Port Lions, which has 91 jobs among the 256 permanent residents and per capita incomes that are higher by 33%.

Of the villages listed in the previous table, one (Ouzinkie) is most like Port Lions in the sense of high per capita income ($19,300 at Ouzinkie vs $17,500 at Port Lions); has a high ratio of jobs to population (.35 at Ouzinkie and .48 at Port Lions); and has largely a native population.(.87 at Ouzinkie and .64 at Port Lions). The communities are only a few miles apart by water and most importantly a large number of the individuals are close relatives with a long history of family ties indicating that values, customs, food preferences, hunting and fishing practices, and life styles are similar. Two major differences are that Ouzinkie is located in a natural bight not subject to the storm waves that render the harbor at Port Lions ineffective; and the subsistence harvest at Ouzinkie is 21% larger.

With the Port Lions harvest at 333 lbs. per person and an average of the nine comparison communities at 454 lbs per person, there is an indicated potential benefit to be derived from expansion of harvest opportunities. Improving the boat harbor is one element that can contribute to expansion of harvest activity for Port Lions. Assuming the needs at Port Lions will be balanced when the community meets a harvest equal to Ouzinkie, at 403 lb per person; an increased harvest of 70 lbs. per person is projected for the with-project condition. A 70 lb. per person increase in subsistence harvest valued at $4.00 per lb. based on State of Alaska methodology for evaluation of subsistence harvest at between $3-$5 per lb. replacement value, represents a mid range benefit estimate of $53,500. Nothing is netted out for the cost involved in the harvesting of an added 70 lbs. per person because the improved harbor will result in fewer trips diverted to other harbors and will allow the duration of trips to be stretched while underway if success rates warrant additional time. These cost saving effects are assumed to balance any increase in the number of trips encouraged by the presence of an all weather harbor.

The subsistence benefit estimated at $53,500 may seem high at $280 per person; however this is less than 2% of per capita incomes at Port Lions. When compared on a broader geographic basis, available data shows that subsistence replacement costs represent 59% of Native family income in the western region, 31% of Native family income in the arctic region, and 22% of Native family income for all rural Alaska.[62]

Value of the subsistence harvest within the state economy as a whole has been estimated but there are no known documented studies establishing the economic value of the subsistence harvest at Port Lions proper. Reports generated by the State generally apply a value ranging from $3 to $5 lb. Persons with resources to trade frequently advertise wares on Alaska radio programs. The following is a sample of such advertisements made on the Kotzebue Swap-N-Shop program. The list would translate roughly to $12 lb.

---

[62] Subsistence In Alaska: 1994 Update, Division of Subsistence, Alaska Department of Fish and Game Box 25526, Juneau, Alaska, 99802, March 1, 1994

- Gunny sack of whitefish, $1.00 per pound
- Five to six pound blocks of black muktuk for sale at $15.00 per pound. First come first serve
- Plain seal oil for sale, $2.00 per pound
- Dried ugruk meat, $3.50 per pound
- Paniqtuq mixed with cooked meat, $2.50 per pound
- One whole ugruk skin for mukluk bottoms, $105.00
- Beluga muktuk for sale, $4.00 per pound
- Blueberries and cranberries for sale, $100.00 for 5 gallons
- Five marten skins for sale from Huslia, $50.00 each
- One large dark wolverine skin with long hair for sale, $500.00
- 70 muskrats from Noovik for sale. Also a wolf and wolverine skin (no price mentioned)

The State takes the position that subsistence harvests are a substitute for goods that benefit widespread household needs not just the dining table. At $12 the increased harvest would be valued at $160,400 constituting a high range estimate.

Some arguments are made that the subsistence harvest should be valued at the lowest food replacement cost, about $2 per lb. If the subsistence harvest is valued at $2.00 per lb. based only on the alternative cost of food supplies, plus $.33 per lb. for transportation to the community, cost of the increased harvest would be valued at $26,700, a low range estimate.

6.15 Harbor of Refuge

According to the National Research Council, the fishing industry has the most hazardous occupations in the United States. Fatality rates for commercial fishers are significantly higher than any other industry. When the safety of a vessel is threatened due to situations such as failure of pumps, power, through hull fittings, navigational equipment, steering, auxiliary systems, electronics, shifting load, debris collision, sea conditions, grounding, electrical problems, cooling systems, fire, hydraulic failure, injury accident on board, etc. professional mariners contacted claimed that a prudent operator will seek shelter so that the problem can be corrected before it becomes an at sea emergency. Increasing the opportunities to access an all weather moorage will enhance prospects that a vessel in danger will be able to perform self-rescue through accessibility of a safe haven.

The proposed harbor project would add some 89 year-around protected moorages at Port Lions. Among present users, the larger vessels occupy stalls ranging up to 62 ft in length with the largest vessels being 58 ft. The size distribution of long-term harbor occupants [63] is summarized below from the daily harbormaster log dated 08-02-01:

[63] Long-term in the sense of rental agreement but 20 vacate the moorage during the winter months due to risk of damage.

Table 17. Summer Season Harbor Use At Useable Slips In 2001

Length	62 to 49 ft	48 to 41ft	40 to 31ft	30 to 25 ft	<24 ft	Total
Number	3	5	13	10	24	55

All of the slips that can safely moor a vessel in the present without-project condition are now occupied and the Harbormaster is comfortable that if vacancies were to develop he would be able to fill them immediately as inquires about vacancies are continual. All persons interviewed during the 2001 field visit anticipated that all of the slips in the harbor would be occupied if they were safe from the weather and in a good state of repair.

Docks that are now badly damaged have become useless for vessels seeking shelter therefore during storms many vessels in need of refuge are turned away. When the limited useable area of the harbor is full, all other vessels must be turned away because of the high risk of loss in the harbor. The turned away vessels are forced to unprotected waters where chances of damage and loss are higher. Persons interviewed were unable to provide any monetary estimate of value regarding the value of a harbor of refuge except to say it could be priceless to a vessel in trouble. Some did point out that if the harbor were made safe, and if it was developed to the original scale, it could provide year around shelter for up to 89 more vessels then it does in its present condition. In addition to this it could serve as an emergency safe haven to other mariners.

United States Coast Guard data shows that for fishing vessels of all sizes in Alaska, there were 613 casualties (loss of vessel or person or both) between January 1989 and December 2002[64]. During the period there were an estimated 11,650 at sea emergency situations in which a vessel was in danger, an average of 1,016[65] each year. For each loss there were about 19 situations that were resolved without total loss of the vessel.

Based on a year 2002 list of vessels registered with the Alaska Commercial Fisheries Entry Commission, there is a universe of 14,243 commercial vessels registered in the state. Of those vessels, 7,034 are licensed for the salmon fisheries. According to US Coast Guard data, among salmon fishers there were 212 casualties (includes 63 man overboard incidents) and 149 vessel losses in Alaska waters between 1989 and 2002 an average of over 11 vessel losses per year, about 35% of losses including all fisheries. These salmon fishers were vessels less than 58 ft in length actually fishing for salmon or intending to fish for salmon at the time of the sinking. Within the fleet that fishes near Kodiak, each year there has been an average of 6 sinking, about a 1% chance of loss for all fisheries, year around considering the 526 salmon fishers in the Kodiak Census Area in 2002. The number of serious distress incidents annually within the Kodiak area is estimated at 114.

Potential vessel loss will be reduced as a result of adding 89 (original capacity of 124 slips now deteriorated to 35 year around slips) equivalent annual moorage opportunities to the 596

---

[64] Source data provided by personal communication LCDR Ernie Morton, 17th Coast Guard District, Fishing Vessel Safety

[65] Estimated based on personal communication LCDR Sue Workman, data for the 17th Coast Guard District, Alaska

for vessels of all types less than 58 ft that already exist in the Kodiak area. The 596 slips exclude those designed for vessels over 58 ft or which are occupied by vessels over 58 ft. This 15% (89/596) increase in opportunities to seek shelter is assumed to have a bearing on reduction in risk of damage and distress for the fleet compared to exposure that the fleet would have in the without-project condition.

It is an oversimplification to present the relationship between increased storm shelter and reduction in vessel loss as direct and causal because there are numerous other variables to take into account. Many of these other variables tend to dilute the beneficial aspect of added shelter as it relates to prevention of vessel loss. Some of the variables are not possible to adjust for in a reliable way due to limitations caused by lack of data. Some of the important but non-quantified and somewhat unknown circumstances would include variables such as training, experience, skill, knowledge, ability, and judgment. Also not entirely known in many cases are accurate statistics regarding particular aspects of the weather and sea conditions at the actual location of the loss. Data describing other important crew factors such as physical condition, tiredness, cold, and personal preparation of individuals on board and condition of the vessel and equipment on board are also not available to the analyst or accounted for.

Related to the above and equally important are the age, condition, handling characteristics, load, and location of the vessel. Largely, many of these factors can be researched and identified for specific vessels; nevertheless there are numerous unknown physical variables that influence how successfully one deals with hazards at sea. In this report the position has been taken that all of the variables were present in some unknown mix in all of the 613 commercial fishing casualties in Alaska waters during the 1989 to 2002 period. Since the mix of these factors is not known, it is not possible to determine reliably that a particular factor such as crew training would have a bearing on decreasing vessel losses although such a connection would appear to be a reasonable assumption. Nor can it be said with absolute certainty that a particular factor such as availability of shelter from a storm would have a bearing on decreasing losses although it is clear that none of the vessel losses occurred within a protected moorage, and it is logical and reasonable to assume that pursuit of a safe haven would become a very high priority.

Based on a consensus of professional mariners contacted for their opinion on the role of a harbor in the prevention of vessel loss, the asserted logic is that if the safety of a vessel is threatened due to situations such as failure of pumps, power, navigational equipment, steering, auxiliary systems, electronics, etc. a prudent operator will seek shelter so that the vessel can be repaired before the breakdown becomes an at sea emergency. Experienced professional mariners define a harbor as a safe haven and maintain that knowing the location of the nearest harbor becomes life saving information in times of emergency. Given this proposition, some of the variables that we can take into account while assessing the economic value of risk reduction provided by an additional safe harbor are:

- **Probable Number of Vessels Relying on Port Lions in an Emergency -** This analysis deals only with reduction of risk to the Kodiak area salmon fleet because these vessels are the most likely users of an expanded shelter opportunity at Port Lions. It further reduces the vessels that are considered potential beneficiaries by excluding those

that conduct harvesting activity closer to any port other than Port Lions' and by excluding probable inactive vessels.

Adjusting for vessels that sit out the season (about 26%) and adding those that originate beyond Kodiak Island makes a group of salmon fishers estimated at 616 vessels. Of the 616 active salmon fishers, a compilation of fish receipts indicates that 74% of them fish northwest of Narrow Strait or in adjacent waters of Shelikof Strait both of which are closer to Port Lions than any all weather harbor.

- **Number of Days the Fleet Will be at Risk of Weather Related Loss -** The salmon fishing months of late May – mid September includes the preparation and follow up period and spans about 19 weeks, just over a third of the year. The average salmon vessel is geared to fish in at least one other fishery thereby extending its income potential beyond the summer. This analysis deals only with the salmon fleet during the period when the salmon harvest is active, and has nullified prevention of losses during the balance of the year using a factor of .36.

- **Casualty Losses Not Preventable by a Safe Harbor -** It is clear that lack of an accessible safe harbor can be blamed as a contributing factor for some but not all of the losses. There are other primary factors such as fire on board, man overboard, collision, and death from an accident on the vessel; none of which probably could have been alleviated by the availability of a safe harbor in close proximity to the vessel. A review of all casualties shows that this set of incidents constitutes 34% of the 616 cases of loss statewide from all causes between 1998 and 2002. Consequently total losses have been adjusted downward by 34% to account for the fact that a readily available harbor might not provide relief for every serious problem. Arguing against this downward adjustment is the consensus among professional mariners that the first strategy one employs when equipment failures, serious accidents, or catastrophic events occur at sea regardless of whether they create an immediate emergency is to seek a harbor where the failure can be repaired and the vessel can be put back into safe operating condition as soon as possible. The accepted standard operating procedure among professional mariners is that seeking refuge of a harbor is of paramount importance and necessary to prevention of minor mechanical problems becoming at sea emergencies.

- **Size and Value** - Vessels lost due to hazards at sea are not necessarily old or poorly maintained. The vessels demonstrate a variety of design variations, but the design parameters are fairly narrow as they are dictated by the purposes of the vessels. During the 1989 to 2002 period, the size range of vessels sunk was from 25 to 108 ft. Average size of salmon fishers and tenders involved was 61 ft because the list includes some large tenders. The average size excluding tenders was 41 ft.

The NED benefit estimate is based on the assumption that there is a tie between available safe havens and success of self rescue activity from an at sea vessel emergency or from less dire events that eventually could lead to one. Presence of a safe haven in close proximity to the vessel is presumed to reduce the risk of loss below the threshold of total casualty loss. The hypothesis is that a 15% increase in protected moorage at the nearest harbor to the fishing grounds will reduce risk of preventable casualty loss to vessels in the immediate vicinity by an equal amount when the above risk factors are accounted for.

The potential lower range loss reduction credited to Port Lions improvements is estimated at $26,000 annually (616 vessels at risk x $118,400 weighted average vessel value x .01 loss rate x .36 salmon season x .66 potentially harbor preventable x .15 increase in safe havens).

Table 18. Weighted Average Value Expanded Port Lions Fleet

	58 ft Seine/Longline/ Crab	45 ft Seine/Longline/ Pot/Jig	32 ft Longline/Net	22 ft Net	
Investment	$336,000	$143,000	$67,000	$33,600	
Fleet %	7%	45%	43%	5%	
Weighted	$23,520	$64,350	$28,810	$1,680	$118,360

The weighted average value of the Port Lions fleet is used as a proxy for the overall fleet value.

The potential high range loss reduction is $102,900, and differs from the low range value in that it expands the number of vessels at risk to include non-salmon fishers[66] and incorporates loss prevention over the entire year (762 vessels at risk[67] x $118,400 value x .01 loss rate x 1.0 year around season x .76 potentially harbor preventable x .15 increase in safe havens). Neither estimate of loss reduction includes a value for prevention of other damage, lost time, search and rescue cost, or injury and loss of life all of which are significant issues within the Alaska fishing industry.

6.16 Search and Rescue (SAR)

The continuing circumstance is that on average 114 search and rescue missions happen in Kodiak area waters every year and related rescue attempts place a tremendous economic burden on taxpayers and presents a persistent risk to the rescuers. The average cost of an SAR mission in Alaska is $6,800. SAR missions in Alaska average 1,100 each year, so the average annual statewide cost is nearly $7.5 million[68]. In addition to the USCG SAR costs there are other costs, which need to be considered to arrive at the societal cost of SAR.

- Search and rescue at $6,800 variable cost per incident for USCG.
- One day search time by each of eight other fishing vessels in the area at a total daily cost per incident of $9,600 (variable cost only, 45-ft vessel assumed typical).
- Lost time at $15[69] per hour for a crew of four, 24 hours per day for each of the search vessels = $11,500.

---

[66] No adjustment made for higher vessel value and excludes summer season influx of salmon harvesters.

[67] Kodiak Census Area all species permit holders in ’00. Excludes out of area residents.

[68] The National Institute for Occupational Safety and Health (NIOSH) accessible at http://www.cdc.gov/niosh/fishdisc.html . NIOSH is the Federal agency responsible for conducting research and making recommendations for the prevention of work-related disease and injury. The Institute is part of the Centers for Disease Control and Prevention (CDC).

[69] $15 is one-third the average wage equivalent for Alaska fishermen.

- Lost time for the object vessel crew at $15 for four crew members, for three days per incident to include refuge / repair time = $4,300.

These costs total $32,200, for each SAR event. With an average of 114 search and rescue events per year, in the Kodiak area, annual NED economic cost is $3,670,800 ($1,869,000 without lost time). Looking only at SAR costs related to problems of the salmon fleet during the salmon season; it is assumed that hazards on a per vessel basis are similar to those of the fleet overall although it is known that some aspects of the fishery are more hazardous than others. Preventable low range SAR costs for the salmon fleet are estimated by: $3,670,800 x .56 portion of the census area permits that are for salmon vessels in 2000 x .36 salmon season x .66 potentially harbor preventable x .15 increase in safe havens = a potential benefit of $73,300. Preventable high range SAR costs for the salmon fleet are estimated by: $3,670,800 x 1.0 to include all vessels x 1.0 to include all seasons x .66 potentially harbor preventable x .15 increase in safe havens = a potential benefit of $363,400.

In this report a benefit value has not been estimated for prevention of loss of life because the value of human life itself is infinite. Nevertheless it is recognized that some recent work by the Transportation Research Board of the National Research Council[70] has discussed willingness to pay as a means of estimating the amount of expense that could be incurred in the interest of saving lives. There is also a study by the Federal Highway Administration[71] that evaluated deaths and injuries based on how much people are willing to pay to protect them. Average costs were as follows:

- Cost per fatality $2,300,000
- Cost Per Non-Fatal Injury $46,000

Using the above parameters for insight into the value of a harbor of refuge, indications are that prevention of one additional fatality per year and 20 non-fatal accidents could add an estimated benefit of $3,200,000 million annually.

Other studies estimate the economic value of human life and numerous cases of legal damages where the courts have awarded settlements involving compensation to survivors. One recent academic study by professors at Columbia University referenced the amount spent on highway safety and related it to reductions in fatalities. It placed the value at $1,530,000[72]. As now presented, this report claims no benefit for prevention of loss of life.

---

[70] Paying Our Way: Estimating Marginal Social Costs of Freight Transportation, Report No 246 TRB NRC, National Academy Press, Washington DC 1996.

[71] The Costs of Highway Crashes, FHWA, US DOT, 1991.

[72] Professors Calculate Monetary Statistical Value of Human Life, Daily Princetonian, Wednesday, October 9, 2002, Evelyn Russel

6.17 Annual Benefits

Benefits represent the economic efficiencies that can be achieved by a project such as an improvement to the Port Lions small boat harbor. Comparing a without-project condition to a most likely with-project condition identifies them. In some situations the economic costs of the without-project condition are more easily observed, described, and quantified while those of the with-project condition are more appropriately treated as range values.

In the following tabulation of benefits for the NED Plan the differences between the without project and with-project condition are shown thus providing a range of benefits representing a high and a low and a value within the range selected as the "most likely value". The benefit table represents the results of improvements at Port Lions, which would be adequate to provide the harbor with the originally intended year-around use for a fleet of up to 124 full time vessels. [73]

Table 19. Summary Of Benefits Ned Plan ($000)

Benefit Category	Low Range	Selected	High Range
Preventable Marina Damage	189.4	252.9	252.9
Local Emergency Cost	18.1	18.1	136.5
Damage to Skiffs	15.6	15.6	28.2
Beaching Damage	3.5	3.5	12.5
Large Vessels Set Adrift	13.5	13.5	13.5
Lines	5.5	8.8	8.8
Cleats	0.6	0.6	4.0
Vessel Tending	0	0	0
Vessel Damage at the Docks	3.4	6.8	10.3
Reduction in Harvest Cost	122.7	361.9	601.1
Water Taxi Service	49.3	49.3	49.3
Alternative Port Impact	0	0	0
Subsistence (Other Direct Benefit)	26.7	53.5	160.4
Harbor of Refuge (Other Direct Benefit)	26.0	26.0	109.9
SAR (Other Direct Benefit)	73.3	73.3	363.4
Total	$547.6	$883.8	$1,750.8

6.18 Project Optimization

Although it is evident that a project to provide year-around protection to the local fleet is economically justified at Port Lions, one must demonstrate that the recommended plan of improvement is at an optimum scale in economic terms. Generally this means that the scale of the project in terms of overall size; and the depth of the project cannot be improved upon while achieving greater net benefits. To test that the plan of improvement is at an optimum, two other scales of protection were evaluated. In terms of vessel capacity these scales represent a capacity of 62 and 186 respectively.

---

[73] Port Lions Small Boat Harbor Breakwater Repair, Letter Report No. 1, Alaska District Corps of Engineers, 25 June 1982.

In addition the comparison of incremental benefits and costs to identify the NED scale, cost estimates for four design variations of a 124-vessel harbor were developed to demonstrate that the selected 124-vessel harbor is a cost-effective choice. The plan variants are:

- Alternative 1A - Alternative 1a would consist of rubblemound and floating breakwaters. The existing floating breakwater would be removed and disposed of at an upland site. No dredging would be required.
- Alternative 1b - This would consist of two rubblemound breakwaters. The existing floating breakwater would be removed and disposed of at an upland site. No dredging would be required.
- Alternative 3b - This plan would consist of a single rubblemound breakwater. The existing floating breakwater would be removed and disposed of at an upland site. No dredging would be required.

6.19 Benefit Curve

A benefit curve was constructed for varying scales of Plan 3b (the cost-effective design alternative) by first calculating benefits for the 124 vessel harbor then identifying the changes that would happen if the project size were to be increased or decreased. Some of the benefit categories are independent of adjustments in size of the harbor while others are directly related.

The following table illustrates how the benefits are tallied for harbors capable of providing permanent protection to fleets of 62 and 186 vessels respectively.

Table 20. Benefits For Three Harbor Sizes ($000)

Number of Moorage Slips	62	124	186
Preventable Marina Damage	252.9	252.9	252.9
Local Emergency Cost	18.1	18.1	18.1
Damage to Skiffs	15.6	15.6	15.6
Beaching Damage	3.5	3.5	3.5
Large Vessels Set Adrift	13.7	13.7	13.7
Lines	8.8	8.8	8.8
Cleats	0.6	0.6	0.6
Vessel Tending	0	0	0
Vessel Damage at the Docks	3.4	6.8	10.2
Reduction in Harvest Cost	180.9	361.9	398.1[74]
Water Taxi Service	49.3	49.3	49.3
Alternative Port Impact	0	0	0
Subsistence (Other Direct Benefit)	53.5	53.5	53.5[75]
Harbor of Refuge (Other Direct Benefit)	26.0	26.0	26.0
SAR (Other Direct Benefit)	73.3	73.3	73.3
Total Annual Benefit	$700	$884	$924
Total Annual Cost	$537	$610	$693
Net Annual Benefit	$163	$274	$231
B:C	1.3	1.5	1.3

6.20 Cost Effective Choice and NED Depth

Of the above alternatives it is clear that plan 3b is the cost-effective choice. It accomplishes all that can be accomplished by other plans scaled to protect 124 vessels and does so at a lesser cost. Alternative 3b requires no dredging and is able to use the channel and basin depths of the existing project to provide unhindered access to all of the fleet without delay and without risk of bottom damage. The existing project provides depths at -10 to -20 ft MLLW with depths in the entrance between -15 and -20 ft MLLW. The deepest draft vessel using the harbor is anticipated to be a 58 ft seine / combination vessel with a loaded draft of 10 ft leaving adequate safety clearance after allowing for normal movement of a vessel underway. A testing of incremental project depths is therefore unnecessary as it is not possible to provide the estimated project benefits for the optimum fleet at any less cost. Also, the cost of non-Federal harbor facilities is not an issue in the test of cost-effectiveness because the same harbor layout can be used with appropriate depth variations.

[74] Benefits limited to low season demand by an increment of 13 vessels over the 124-vessel harbor.

[75] Other Direct Benefits are held constant throughout the range of harbor sizes tested because they result from the provision of a protected harbor not a harbor of a particular size.

7.0 SENSITIVITY OF THE ECONOMICS TO CHANGES IN DATA AND METHODS

7.1 Purpose

The purpose of this discussion of risk and uncertainty is to test the sensitivity of the results of the economic analysis to changes in some of the input variables and methods representing the "most likely" case. The value of this test is to reveal how the economic analysis result might vary if inputs selected for the benefit evaluation are selected differently or applied differently thereby providing insight to the amount of confidence one can have in the economic analysis. Issues that deal with variations in data and methods are sometimes referred to as risk and uncertainty (RU) issues, and one of the techniques of revealing their significance is referred to as Sensitivity Analysis.

Within the Appendix, presentation of the probabilistic aspects of the methodology and some of the data also provide insight to the risk aspects of the analysis. For example, probabilistic aspects of wave and weather data can be found in the Hydraulics and Hydrology Appendix (H&H). The economic analysis is consistent with the probabilistic data in the H&H appendix in the sense that data ranges and general frequencies were applied in the economics. Nevertheless there is inadequate data to allow development of a probabilistic economic simulator so the economic analysis and the risk and uncertainty analysis are dependent on a presentation of range estimates.

Typical of this type of analysis, data is often derived and applied using techniques, which they are not perfect. Methodology is sometimes selected from more than one available choice and selection may be influenced by time and dollar budgets or by the anticipated significance of a variable in the overall study. Even in cases where data is based on a 100% sample, the results can be distorted by being out of date or by being inappropriately applied or misinterpreted. There is rarely such a thing as perfectly certain, zero risk, or strictly up to date information. To be perfectly certain one would need perfect hindsight and foresight neither one of which exists. To remove all risk one would need to have a perfect view of the future, and to be up to date on all facts one would have zero time to gather them, analyze them, report them, publish them, and use them. The planning horizon in this report centers on harbor improvements, which have an economic life of 50-years. Therefore life cycle costs reflect a 50-year span and benefits are based on economic gains attributable to the project also over 50-years.

Taken to an extreme one would need to examine and test the risk and uncertainty of every concept, assumption, bit of data, analysis, and conclusion, separately and in combination with one another to satisfy all of the possible curiosities. This would be impractical, so the scope and intent in this RU discussion is oriented toward identification of the degree to which changes in some of the major aspects of the analysis will have a material affect on the outcome. Since not everything is to be tested it is necessary to apply some practical judgment to selection of the important variables to be evaluated.

7.2 Selection of Variables

During the course of preparing the Economic Appendix there were numerous decisions made regarding the proper representative data point or mark, among many ranges under consideration. Selection of the appropriate mark was based on rational analysis specifically designed to steer judgment to a "most likely" value. The term "most likely" itself has uncertainty aspects in that it requires some interpretation and judgment because most likely is not necessarily something arrived at with a mathematical formula except were statistical outcomes are being compared probabilistically. The activities involved in development of each of the variables being assessed in this part of the report contain intermediate judgments and related analysis in combination with significant data inputs, and should not be interpreted as being intended to constitute statistical or mathematical criteria for meeting the criteria for "most likely".

During the course of developing the benefit evaluation and plan formulation the proposition developed that the outcome for the economics of the NED plan might be more sensitive to changes in some parts of the analysis than others. The proposition stated that some factors more than others can be viewed as determinants of the project cost and benefits, and the factors described as having this characteristic include but are not necessarily limited to the following:

- Fleet Size
- Active Fleet Size
- Vessel Operating Cost
- Fuel Cost
- Fuel Use Rate
- Number of Season Openings and Number of Returns to Port
- Preventable Maintenance and Labor Value
- Local Emergency Cost and Period of record
- Inclusion of Benefits for Harbor or Refuge and SAR
- Without-Project Condition

Each of these variables has some significant demonstrable basis for being represented by a potential range of values, and range data for each was identified during the study. This discussion looks at the range values and compares the economic analysis results using the most likely number, with economic analysis results, which are produced using the low value and the high value of the range.

7.3 Fleet Size

The universe of potential customers for Port Lions is based on an estimate of the vessels that could achieve an increase in net income by using Port Lions instead of an alternative port. Generally this includes any vessel, which presently relies on the fishing grounds adjacent to Port Lions. During the summer this would include a total of 613 vessels. This does not include the usual 22 skiffs in regular use at the village as they are ordinarily dragged from the

water when not needed however the estimate probably includes some unverified double counting stemming from the nature of the data. Potential customers would be attracted from a pool including:

	# of Vessels
Permanent commercial and subsistence fishing vessels using moorage of the inner harbor	35
Hot-berthed seasonal vessels that have been regular visitors	20
Vessels wait listed in the vicinity	102
Salmon fishers that operate closer to Port Lions than Kodiak	456
Total	613

The single largest category of potential customers; also having the highest economic incentive to use Port Lions, is the 456 fishers that operate closer to Port Lions than any other port. If the universe is restricted to this class of potential future users; with a net of 89 moorage spaces anticipated to be provided at Port Lions, this category would have to be reduced by 80% to have an adverse affect on the harvest savings offered by operating out of Port Lions. Considering that in a typical year only 50% to 80% of vessels licensed to harvest actually do so would mean that these 456 vessels would have to be reduced to 10% - 16% of the total number of vessels presently licensed in a typical year. In the most extreme scenario, if the entire salmon harvest industry were to be rationalized by organizing into a cooperative as done in the Chignik experience, the number of active fishers would not fall below 25% which would be 91 not including the other complimentary categories of potential customers. Therefore, in any case the regional fleet provides a generous basis for supporting benefits based on adding 89 year-around moorage spaces. It follows that a radical reduction in the estimated number of potential users will have no appreciable impact on the benefit calculation.

7.4 Active Fleet Size

Typically the number of vessels actually involved in the harvest fluctuates between 50% - 70% of the number of vessels licensed to fish. This partial participation is due to preseason estimates of the numbers of fish that one might be successful in harvesting and the value per pound although even in a year when profits are anticipated to be generous the participation rate is well under 100%. Some of the reasons behind the under 100% participation rate are mechanical problems with vessels, problems is getting a qualified and experienced crew, inadequate advance preparation, insufficient financial resources, and so on. Such participation rates are normal for the industry.

In this report the fleet assessment does not allow for future growth in number of vessels. The Alaska seafood industry is seen as having gone through a downsizing over the last decade due to a profit squeeze caused primarily by competition from fish farms. In response to this the industry has developed a marketing initiative, which concentrates on the quality differences between farmed fish and these harvested from Alaskan waters. The marketing imitative is supported by emphasis on harvest practices that increase efficiency thereby increasing the quality of the harvest while lowering costs and enhancing profit margins. If marketing moves are successful in encouraging consumers to differentiate between farmed fish and those caught in Alaskan waters, then the price competition of farmed salmon will no

longer be a threat. With establishment of product differentiation farmed salmon would no longer be a substitute for wild salmon; and its lower price would not matter any more than the price of chicken or other protein sources not actually in competition as a substitute for a wild salmon product. It is possible under such a supply shift scenario to have a rapid price recovery leading to industry wide profit margins adequate to maintain the present fleet in the future as well as the present.

Combining conservative assumptions to generate a low-end variation in the active fleet size does not lead to an active fleet size small enough to reduce the number of moorage spaces needed at Port Lions. Consequently the project benefits are not sensitive to this variable.

7.5 Vessel Operating Costs

Vessel operating costs are directly related to benefits for moorage capacity and transportation savings, and these categories make up 41% of the total benefits for the NED plan. It is believed that the vessel operating costs established in the report are supportable and would be subject to a very narrow adjustment to represent high range and low range variation; possible no more than +/- 20%. Assumptions behind the analysis are clearly stated and linked to source documents. When the total season operating cost are compared to findings of recent research on operating cost of similar vessels in long season fisheries outside of Alaska,[76] it is found that average seasonal costs for similar sized vessels compare within 5% of the most likely value in this report. In this report the high and low range covers a spread of the hourly operating cost of 26%. The spread represents variations caused by the use of high and low values representing the number of hours divided into annual cost to calculate the hourly average.

A 20% adjustment in the vessel operating cost would change the total benefits for the NED plan by 8% and would not effectively impact the choice of plans or justification of the NED plan. The results of the economics are not materially related to variations in the vessel operating cost in the sense that benefits derived from reduction of operating cost can be deleted entirely while still showing the NED plan to be economically justified.

Vessel operating costs include management expense as a fixed cost. In contrast ER1105-2-100, page E-55 advises for management to be calculated as 10% of variable costs. The procedure in 1105-2-100 yields a larger hourly operating cost. Since the management cost is defined therein as part of the variable cost; use of the formula in ER1105-2-100 yields a higher benefit. The benefits for the low range and the high range scenarios are both increased by 10% for those categories dependent on vessel operating cost savings, about 66% of the total.

This report is not in conflict with the ER 1105-2-100 treatment of management cost even though business expense is presented in the cost tabulations as a fixed cost. This presentation is consistent with the idea that business management decisions continue year-around even where fisheries are seasonal. However, management decision related to operational aspects of the vessel and its crew are included with annual vessel, machinery and maintenance costs

[76] Economic and Operational Characteristics of the Hawaii-Based Longline Fleet in 2000, Joseph M O'Malley and Samuel G Pooley, SOEST 03-01 JAMAR Contribution 03-348

and in that sense that portion of management cost is variable. Some other business management expense is included as a fixed cost such as permits and license expense.

7.6 Fuel Cost

Fuel is a major component of vessel operating cost making up about 20% of the annual operating budget of a 58 ft vessel. Nevertheless, vessel operating cost itself is directly tied to only 41% of the benefits of the NED plan. Taking an extreme position to demonstrate a point the fuel cost can be reduced to zero or doubled which will have the end result of introducing a +/- 8% range in the total benefits of the NED plan. It is concluded that neither the economic justification of the NED plan or the identification of the NED plan is sensitive to the cost of fuel used in the vessel operating budgets.

Fuel values were based on actual sales at Kodiak as documented in the Pacific States Marine Commission PACFIN database. The database records sales at numerous Alaska ports weekly. The $1.30 value in the report is an average of the most recent 12 months available at the time of report preparation. In more recent months fuel prices have increased considerably, and the affect of higher prices would be to increase the total benefits (operating cost savings) for all sizes of harbors investigated.

7.7 Fuel Use Rate

Fuel use rates are based on manufacturer's data for vessels with horsepower ratings identical to the hypothetical vessels used in this report. Variations in the fuel use rates will affect operating cost and will affect benefits tied to the vessel operating costs. However with benefits related to fuel use (vessel operating cost) making up about 20% of the total benefits for the NED plan; fluctuations in use rates would have to be unreasonably wide to have a material affect on plan justification. For example using an extreme fluctuation in fuel use rates of +/- 50% to make a point this would change benefits of the NED plan by only +/- 10%. It is concluded that neither the economic justification of the NED plan or the identification of the NED plan is sensitive to the fuel use rate used in the vessel operating budgets.

7.8 Number of Season Openings and Number of Returns to Port

The benefits for moorage capacity are very sensitive to the number of season openings asserted for a typical season and the number of returns to port made by each vessel. Having an expanded number of all weather moorages in place at Port Lions reduces the travel cost of the fleet that would be fishing closer to Port Lions than any other port

For a low range estimate of the economic advantage that could be provided by restoration of Port Lions to its originally intended scale of operation, an increment of 89 Port Lions slips was assumed to contribute salmon season trip savings based on a typical year of 43 closures. Return trips were assumed to take place at half the closures x 89 vessels = 1,913 trips. This was adjusted downward by 5% to account for vessels under 23 ft, which would not be considered as serious salmon harvesters. It was also be adjusted downward by an added 27% to account for vessels that might not be active harvesters during a particular opening. The low range estimate applied a low range operating cost of $25 and nothing was included for

saving related to leisure time recovery. The low range benefit for related water taxi costs for the crew is $122,700.

For a higher range estimate, the number of vessels participating was increased to 80%, and return trips were assumed to take place at each closure. Using the higher participation rate results in 3,062 trips and substituting an upper range vessel operating cost at $38 yields a high range a travel cost savings of $601,100 after netting out crew water taxi cost.

This is the widest range of any benefit category and the project justification is based on a mid-range value of $361,900. The benefit category reflects the primary reason for the project and it is anticipated that the benefit would be a significant portion of the total. It is reasonable to accept that it should have a wide range from high to low because the methodology incorporates variations in assumptions bracketing best-case and worst -case scenarios that developed during visits to the site. The significance of this wide variation is that by itself, it introduces a range in benefit-to-cost ratios ranging from 1.2:1 to 2.0:1. However they represent extreme scenarios that may happen in a given year but which are not considered typical in the long run. Most likely there will be fluctuations from year to year but the mid-range is a reasonable characterization of the so-called typical year or "average" year.

7.9 Preventable Marina Damage

The preventable maintenance costs represent a 19-year history. It is presumed that the project history is a reasonable basis for annualizing costs and that the cost as annualized over the 19 years of record is a reasonable representation of annual costs that could be anticipated over the next 50 years, $189,400. This is considered to provide a low range estimate because the harbor reached this state of advanced deterioration several years ago and it continued to accumulate some residual damage each year because of lack of resources needed to repair it completely and local efforts were only able to apply a temporary repair to the worst problems.

For a high range value, a case could be made that it should have been the subject of major repair and rehabilitation before late 1995. This timing is supported by condition reports and results of inspections and observations during remedial work following damage from the winter of 1994 -1995. This would yield $252,900 and although it is the high range value it is considered to be the most likely as well.

7.10 Local Emergency Cost

Major variables in the construction of low range and high range benefit values for this category are:

- The number of storms in a typical year ranging from 15 to 20
- Number of person involved in emergency activities ranging 4 to 11
- Amount of time spent per person ranging from 6 to 8 hours each day
- Imputed hourly value of labor
- Assumed overhead rate

- Length of storms generally ranging from 2 to 3 days
- Choice to use financial cost or opportunity cost

Using these variables the annual NED economic cost (uncompensated labor plus imputed overhead, plus direct labor) ranges from a low of $18,100, to a high of $202,800. The high range estimate uses $14.00 for a labor value and a labor cost multiplier of 2.5 with documented out-of-pocket cost. The labor multiplier is applied to the imputed direct hourly labor cost to include an economic equivalent of payroll burden, fringe, supervision, overhead, materials, and administration.

If one applies leisure time loss arguments using an administratively set time value at one third of the earning rate ($26.18 / 3 = $8.73)[77], the range in value of uncompensated labor is $15,600 to $114,500.

In this report the estimated economic value of the uncompensated emergency cost used as a basis for the high range benefit is based on using labor valued at $14.00 per hour plus the labor multiplier because this is the actual direct labor cost for paid labor at the site up to the limit of the community budget. Also the administrative formula set at one third the earning rate fails to recognize that the real value of labor whether donated or compensated has related administrative and overhead costs which are usually greater than the amount of hourly compensation to the employee.

7.11 Inclusion of Benefits for Harbor of Refuge and SAR

Benefits for Harbor of Refuge are $26,000 and benefits for SAR are $73,300 for a total of $99,300. If they are excluded from the benefit analysis total benefits are $900,700. The net benefits of the NED Plan would be reduced to $267,000 and the B:C would become 1.4:1. These benefit categories are non-traditional although they meet all criteria to qualify as NED effects. In the lexicon of the Corps guidance they are referred to as "Other Direct Benefits". Leaving them out would ignore some of the positive resource aspects of the project and would understate the importance of safety as an issue.

The analysis, which establishes the benefit value, also indicated an upper range of uncertainty extending up to 4.7 times above the low range value. The low range value was used as the "most likely" to offset the high uncertainty in the estimate. Changing some assumptions however it is noted that an extreme low value characterized as a "worst case" could have been derived arrived at the low-range value. For example, if one were to reject the proposition that there is a nexus between the presence of a safe harbor and reduction in risk to vessels, then the benefit is reduced to zero. Those who put themselves and their vessels at risk view this scenario as untenable.

---

[77] Average earnings at Port Lions are derived from State data accessible at <http://www.dced.state.ak.us/cbd/commdb/CF_BLOCK.cfm> as follows: Per capita income $17,492 x population 256 / employment 91/ labor hours in a year 1880 / leisure time adjustment 3 = $8.73

7.12 Without-Project Condition

The without-project condition is essentially the continuation of the projects ability to provide year-around moorage for 35 vessels within limitations provided by the marginally functioning breakwater. An alternative without-project condition would be removal of all harbor facilities (except for the skiff / transient dock) and abandonment of maintenance activities. This alternative without-project condition would eliminate any avoided O&M costs and emergency expense from the benefit categories but would increase all benefit categories by about $66,000 annually. The increase is derived from the larger differences in moorage spaces when comparing the with-project and without-project conditions. The net result would be reduction of the B:C to 1.1:1.

This was eliminated from consideration as the without-project condition because abandonment is improbable. Historically the State and community have continued to make maximum efforts are replacing damaged facilities for over 20 years. Considering the economic advantages of the location and its potential contribution to vessel safety abandonment is unreasonable and would appear to be an irrational choice.

7.13 Sensitivity Analysis Summary

If all of the low-range estimates are combined as a representation of the NED Plan accomplishments, total annual benefits are $547,600 instead of the $883,800 associated with the most likely case. This is a reduction in total benefits of about 38%, however benefits generated in this low range scenario are still near 1:1, with a B:C of .87:1. In contrast the B:C for the high range benefits of $1,750,800 would be 2.77:1. There is no statistical basis for assigning a confidence interval to describe the range of possibilities ratios; however a proposition used in assembling the high range and low range benefit scenarios was that the ranges should serve the purpose of capturing 95% of the potential variations around a most likely central tendency case. Interpretation of the stipulated 95% confidence interval was entirely subjective. Variables might occur in combinations producing low range values in some years; however it is highly unlikely that variables would combine year-after-year in ways that would produce a 50-year evaluation yielding a B:C lower than the low range value.

EXHIBIT 1
FOCUS GROUP FORMAT

Focus Group Activity - There was a discussion guide prepared beforehand with expectation that each focus group would consist of 4 - 6 persons. The discussion guide included a short statement read to the participants to establish a broad purpose, agenda, and frame of reference for the meeting. Clarification of planning scenarios including harbor use, damages, and fleet projections; plus verification of study assumptions was the primary analytical data anticipated to be obtained through the meetings. Statistical data was not the objective and there were no questionnaires. There were three separate and distinct focus groups.

Harbor Related Activities - The group includes fishers who had income from harvesting or from supporting it in the vicinity of Port Lions.

Moorage Demand - The group includes owners or employees of established reputable businesses at Port Lions and employees of the local government.

Damages - The group includes government at any level providing it had information, authority, or responsibility, related directly to solving navigation problems at Port Lions. At Port Lions the group includes Harbor users.

Discussion guides and an introductory statement read to participants are attached.

Interview Activity - The venues for conversations were, Port Lions, Kodiak, and Anchorage. The interviews were informal conversational meetings in the work place. There was an advance announcement of the site visit and pre-meeting telephone conversations were held with the Harbormaster, Mayor Office, two charter outfits, one commercial fisher, and one wilderness lodge. During the visit, talks were with four charter operators, four commercial fishers, four captains in need of moorage at Port Lions, and four hospitality workers at Port Lions. The Anchorage interviews gathered data from staff at ADOT&PF, and the Corps of Engineers.

EXHIBIT 2

DISCUSSION GUIDE AND FRAME OF REFERENCE FOR FLEET CHARACTERISTICS (Commercial and Charter Fishers Group)

INCLUDES COMMERCIAL FISHERS AND CHARTER CAPTAINS AND / OR CREW

- Statement of purpose and function of Focus Group
- Name / Vessel / Description / Area of Use
- Best way to contact
- User status
- Opinion on the potential number of commercial vessels and rationale behind the expectation.
- The percentage of their time and capacity used as fishers.
- Describe time requirements for a typical season / day / week.
- Identify commercial fisher harbors utilized, and probable processing and distribution facilities accessed.
- Give an opinion on market conditions present and future.
- Give and opinion of fleet trends related to the future of Kodiak harbors. .
- Describe the w/o project conditions that could be cured if the Port Lions Harbor is improved for year around use.
- Identify and note extreme or range references
- Cost or other measure or effect on individual or others
- Clarification regarding first hand knowledge or other
- Option value comments and anecdotes
- Back check for verification of group message

EXHIBIT 3

DISCUSSION GUIDE ANDFRAME OF REFERENCE FOR THE MOORAGE DEMAND (Local Government and Hospitality Group)

INCLUDES HOSPITALITY WORKERS, HARBOR WORKERS, GOVERNMENT, AND FISHERS

- Statement of purpose and function of Focus Group
- Role at Port Lions
- Name
- Best way to contact
- User status
- Ties with the harbor
- Opinion on ideal moorage requirements.
- Potential for use of Port Lions as a primary or secondary moorage.
- Opinion on moorage demand.
- Back check for verification

EXHIBIT 4

DISCUSSION GUIDE AND FRAME OF REFERENCE FOR DAMAGES
(Government Group)

INCLUDES THE CORPS OF ENGINEERS, ADOT,
AND A GROUP OF HARBOR USERS AT PORT LIONS

- Statement of purpose and function of Focus Group
- Name, Role in Port Lions or related to the study
- Best way to contact
- User status and place of interview
- Discussion of pertinent events, data sources, and effects
- Frequency discussion
- Extreme or range reference
- Cost or other measure or effect on individual or others
- Clarification regarding first hand knowledge or other
- Option value comments and anecdotes
- Back check for verification of group message

EXHIBIT 5

INTRODUCTION to FOCUS GROUP PARTICIPATION
A STATEMENT READ TO ALL PARTICIPANTS

My name is Ken Boire. I am a consultant hired to assist the Corps of Engineers in a review of plans related to possible improvements to the harbor at Port Lions. This small group meeting is for the purpose of providing me with information to develop an economic evaluation of the harbor plans.

I am seeking honest opinions from the group. There do not need to be any sophisticated statistics; however the opinions do have to be clearly understood by me. There is no questionnaire for you to fill out although I have notes to help guide the discussion. The notes are available to anybody that wants a copy. I am going to write down the name and means of contacting the group participants if you wish to supply that information. It is my intention to include it in my report to the Corps along with other information gathered in the course of this meeting and in related discussions.

We will be having a back and forth discussion and I will verify my understanding of the group opinion before we adjourn. The length of the meeting is open in the sense that I will be here as long as you desire to bring out new or clarifying information. I will be at Port Lions until Thursday, and while I am here I can be reached through Wilderness Lodge. After that I can be reached at the address, or phone on this business card.