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DRAFT Benefit-Cost Analysis of the Juneau Aurora Harbor Drive Down Float Project

This Benefit-Cost Analysis was performed by Rain Coast Data to be used in the application for a Port Infrastructure Development Program discretionary grant program administered by the U.S. Maritime Administration by the City and Borough of Juneau Docks and Harbors.

Benefit-Cost Project Summary **2**

Project Description **3**
- **Project Need** **3**
- **Drive Down Facility** **4**
  - Crane Capacity Expansion 5
- **Baseline Scenario** **7**
- **Analysis Approach** **7**

Results of Benefit-Cost Analysis **9**

Benefits **10**
- **Value of Travel Time Saved** **10**
  - Gear Changes 10
  - Mechanical Events 11
  - Additional Efficiencies 12
- **Safety Benefits** **14**
  - Value of Avoided Accidents and Injuries Savings 18
- **Economic Activity** **19**
  - Increase in Shore Processing and Direct Marketing 19
- **Value of Emissions Reduction Benefits** **21**
  - Value of CO2 Savings 21
- **Foregone Maintenance of Moorage Floats** **22**
- **Increase in Freight** **23**

Costs **24**
- **Capital Expenditures** **24**
- **Operations and Maintenance Costs** **24**
- **State of Good Repair and Residual Value** **24**

Benefit-Cost Project Summary

The **Juneau Aurora Harbor Drive Down Float Project** will provide a much-needed infrastructure improvement for the Juneau fishing fleet. The drive-down float and expansion of the crane capacity in the area will create operational efficiencies for fishermen, connect their vessels and harvests directly to transportation systems, and mean that they can eliminate 17,000 hours of move their gear and product by hand over ramps and docks between vessels and parking lots. The drive down float increase safety and create infrastructure that will allow local entrepreneurs to optimize and expand shore-based processing and direct marketing.

Table 1 summarizes the findings of the benefit-cost analysis for the development of a Aurora Harbor Drive Down Float. The ratio of discounted benefits to costs (B/C ratio) is 5.0.

Table 1. Benefit-Cost Analysis Summary Results

Measure	Discounted at 7% 30-years
Value of Time Travel Saved	$11,053,370
Injuries Avoided	$13,597,003
Increased Processing and Sales	$17,963,377
Avoided CO2 Emissions	$31,844
Residual Value	$419,494
Total Benefits	**$43,065,893**
Capital Costs	$8,262,648
O&M Costs	$345,913
Total Costs	**$8,608,561**
Benefit-Cost Ratio	**5.00**

Following the development of the baseline and project scenarios, the following impacts were considered and monetized for the BCA:

- **Value of Travel Time Saved:** Installation of a drive-down float with two new cranes will result in avoided labor costs of vessel operators, who are currently making time-intensive trips back and forth to vehicles on foot over ramp carrying materials by hand. The value of the travel times saved is calculated to be $11 million discounted over a 30-year period.
- **Safety Benefits**: Moving so much freight and supplies by hand cart, often with steep ramps (depending on the tides) or in inclement weather has resulted in documented accidents resulting in various levels of injuries. A drive down float would eliminate nearly 17,000 hours per year of such work. Based on damage costs provided by the US

Department of Transportation, the associated safety value would be $13.6 million discounted over a 30-year period.

- **Economic Activity**: Nearly 200,000 pounds of seafood and mariculture products are brought through the current crane dock in the project area annually. By doubling the cranes available from 2 to 4, and making it much easier to move product with the drive down dock, total pounds of product are expected to more than double, thus increasing the value of shore processing and direct marketing sales by more than $2 million annually, or $18 million discounted over a 30-year period.
- **Emission Reduction Benefits**: Currently vessels that need to use a drive down float must drive 68 nautical miles (round trip) to the nearest drive-down float in Auke Bay. Assuming 80 vessels make this trip one time per year, and also make a corresponding round trip trip with a vehicle by road, installation of the float in Aurora would displace 728 metric tons of carbon dioxide (CO_2) over the next 30 years, with an associated value of estimated emissions reductions discounted over a 30-year period of $32,650.

In addition, the BCA reviews the following non-monetized benefit:

Increased Freight: Currently the Aurora crane dock is used to move several critical categories of freight. Because using the crane dock for freight is arduous, it is expected that the volumes of freight moving through a new drive down float in Aurora Harbor will increase by hundreds of thousands of pounds annually in future years, once the drive down float is installed These include the following:[1]

- Construction Materials
- Vessel Restoration Materials
- Increased Seafood and Kelp Volumes
- Subsistence Fish
- Sports Fishing
- Yacht Provisioning

Project Description

Project Need

Juneau is a maritime community. The largest component of the Juneau maritime sector is the local seafood industry. However, over the past 50 years development of marine services harbor support facilities to support local business has been minimal. The Juneau Aurora Harbor Drive Down Float Project would significantly improve loading and offloading capabilities, improving safety and creating economic benefits.

[1] All information for this section came through interviews with current users of the crane dock.

In 2019, Juneau was the nation's 47th largest commercial fishing port by value, and the 12th largest commercial fishing port in Alaska. In 2021, 2,834 commercial fishing vessels were home-ported in Southeast Alaska, including 452 home-ported in Juneau. The Juneau seafood industry (including commercial fishermen and seafood processors) generated 567 direct year-round equivalent jobs in 2019, and is a significant contributor to the local economy. A missed opportunity affecting the regional and local economy is the transport of raw, unprocessed resources from the state for primary and secondary processing in other states or countries. Only 40% of the fish caught in the immediate vicinity of Juneau is landed in the community for processing. One of the largest monetizable benefit of the Juneau Aurora Harbor Drive Down Float development would be the increase of shore processing and direct marketing. The project will allow expansion of processing and direct marketing and to better serve the needs of local and regional fishermen, along with the larger state and national economy.[2]

Drive Down Facility

The drive down float will be sited just inside the south entrance to Aurora Harbor. The facility consists of a 17-foot by 140-foot transfer bridge connected to shore at the northwest corner of the proposed pile-supported deck. The bridge leads to a 48-foot by 120-foot vehicle-accessible, drive-down float equipped with two 5-ton electric cranes. The float is anchored with steel piles and pile frames surrounded by energy absorbing pile hoops attached to the float. The bridge is primarily supported on the seaward end by a submerged auxiliary float in order to reduce structural loads into the main float. Water, fire suppression, power and lighting utilities will be extended down the bridge to provide services on the main float. The facility is intended to support vessel loading and offloading operations.


Steep ramps in project area during a lower tide

Once the float is installed, fishermen will have much better access to their vessels for activities like provisioning, loading and working gear, and routine maintenance. The ability to drive a truck or service vehicle adjacent to vessels is both safer and more efficient than a regular fixed dock, particularly in Juneau with its tidal range of up to 22'. By creating the Aurora Harbor Drive Down Float, local fisherman will be able to save nearly **17,000 hours annually** of walking back and forth between their vehicles in the parking lots and their vessels in the harbor, using a pedestrian ramp and wheelbarrows, often in inclement weather across a wet dock. These types of activities become **especially dangerous** when the tide is low and the ramps become too steeply angled to use safely.

[2] Juneau Downtown Harbors Uplands Master Plan Bridge Park to Norway Point. City and Borough of Juneau Docks and Harbors, 2017 https://drive.google.com/file/d/0B1GUH8-gVB3uajhPNmN3VTl3R1U/view

Also the drive down dock will connect the local fishing fleet to the transportation network. Fish will be able to move directly from vessels to the road system, making it significantly easier to bring seafood to processing centers and to market. This will be a considerable advantage to local fishermen.

Crane Capacity Expansion

The Crane Dock was completed in 1992 with two cranes, and an expanded vision to add two additional cranes and additional space. The Crane Dock has been essential to numerous other start-up businesses. All manner of fishermen use it for loading and offloading nets, crab and shrimp pots, longline gear, bait, provisions and general fishing supplies. However, the facility is so busy and congested at critical times that it can no longer reliably serve all those who need it.

The crane dock, even with just two cranes, has been a critically-important piece of public infrastructure that has provided numerous Juneau businesses with the ability to compete with much larger seafood companies that dominate the Alaska seafood processing scene. The success of the dock has resulted in overcrowding that threatens its ability to continue in its role as an important business incubator and support.

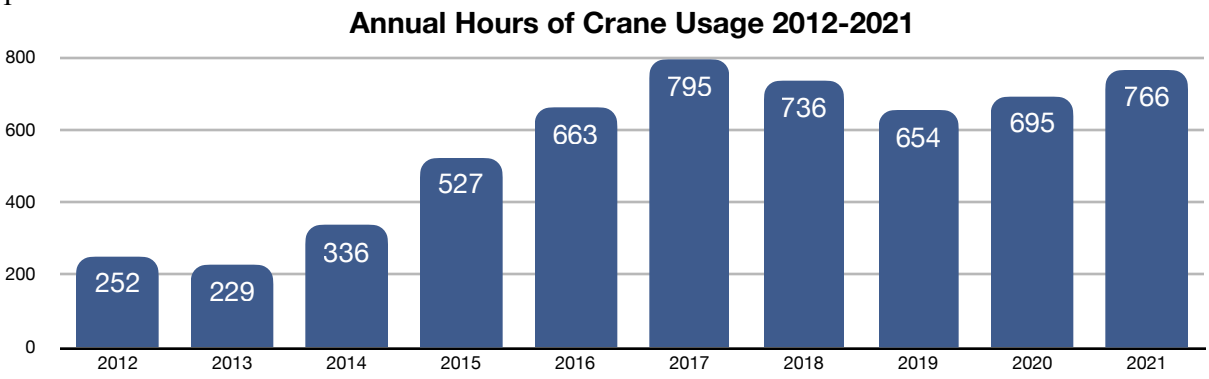
Image shows cranes in use at current crane dock.

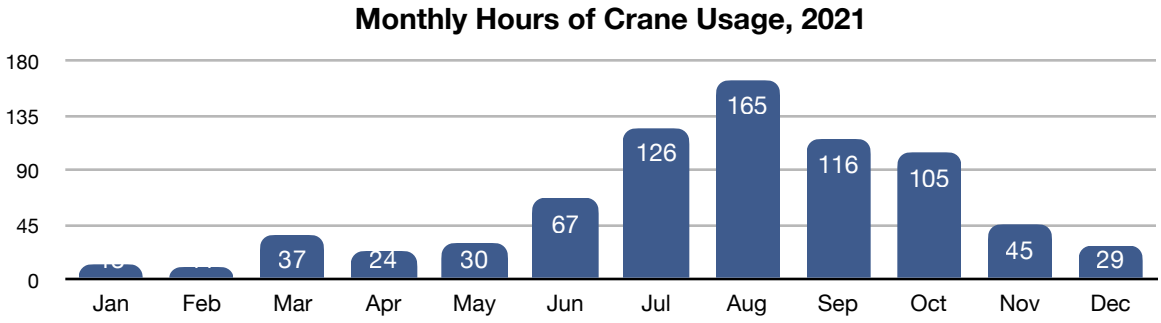
By more than doubling the overall crane capacity by putting two cranes on the drive down float, and creating a more efficient ocean to road transportation connection, the Juneau Aurora Harbor Drive Down Float Project will support existing and new entrant Juneau seafood businesses.

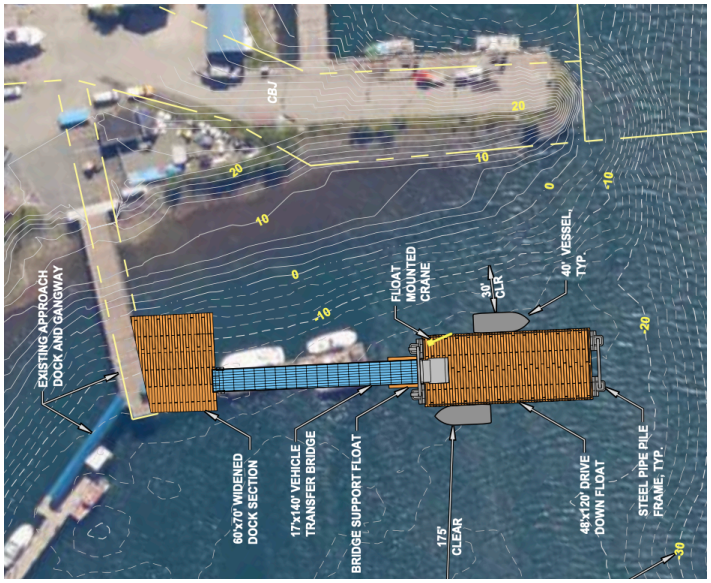
Between 2013 and 2021, crane use in hours has more than tripled as demand increased significantly. Additional cranes would allow for more vessels to use the crane at the same time.

Annual Hours of Crane Usage

Crane use is clustered around fisheries openings. On the chart below, daily usage is charted over 2021. Top usage was in July, August, and September. The intensive use time of the crane means that fishermen and their crew must wait to use the crane, which reflects a significant opportunity cost during busy fishing seasons and delays in getting product to market.







Engineer's drawings of new drive down dock.

Baseline Scenario

The BCA quantifies the public benefits that will accrue if the Aurora drive down dock is developed. The "without project," or baseline scenario, assumes that several elements of the existing infrastructure will reach the end of its useful life in upcoming years and need to be replaced. Without development of the drive down float numerous basic transportation challenges will not be addressed including safety, congestion, mobility of goods, and "parking" for vessels (moorage).

- **Lack of Sufficient Crane Capacity:** The crane dock will remain overcrowded at key periods, such as weekly salmon fishery closures or for gear changes between salmon and crab openings.
- **Unsafe Conditions:** The lack of a drive-down facility component means that fishermen and their crew will continue to spend approximately 17,000 unnecessary hours annually moving goods and supplies up and down ramps with handcarts.
- **Fishermen not Connected to the Transportation Network:** Fishermen will continue to not be able move their product directly from vessels to the road system, and it will continue to be difficult to bring seafood to processing centers and to market. It is a considerable economic disadvantage when the local fishing fleet and local fishermen are not connected to the transportation network. The ocean-to-road freight connection will not occur, making expansion of processing and direct marketing more difficult, meaning that minimally processed seafood will continue to be shipped to China for secondary processing, rather than having a portion of those economic activities transfer to Juneau.
- **Freight expansion will not occur:** Expansion of freight to serve the construction, maritime, substance, sports fishing, yacht, seafood, and mariculture will not be able to expand.
- **Emissions Will Not be Reduced:** Vessels will continue to make the 68 nautical mile round trip to the nearest drive down dock (which is also incredibly congested), needlessly expelling carbon emissions.

Analysis Approach

The Project Summary matrix (Table 2) provides a summary of the population impacted, the benefits of the project, and a reference to where each impact is discussed in this report.

Table 2. Project Summary Matrix

Current Status/ Baseline & Problem to be addressed	Change to Baseline	Type of Impacts	Population Affected by Impacts	Economic Benefit	Summary of Results	Page Reference in BSA
Juneau is the 12th largest commercial fishing port in Alaska; however, it lacks adequate infrastructure for Juneau's fishermen. Fishermen in downtown Juneau cannot access their vessels by vehicle and must perform all gear changes and maintenance by foot, carrying gear by hand, a labor- and time-intensive activity resulting in accidents. The lack of completion of a drive down crane dock has also hampered growth of seafood processing and direct marketing.	Install a drive down float with 2 cranes	**Travel Time Saved Benefit**	Commercial fishermen located in downtown Juneau, operators of commercial vessels, direct marketers	Avoided labor costs of vessel operators and their crew making time intensive trips back and forth to vehicles on foot over ramp carrying materials	Estimated time/wages cost savings of nearly one million dollars annually, or $11 million discounted over a 30-year period	Page 10-13 BCA Tabs 1,2,4
		Safety Benefits: Accidents Avoided		The value of injuries and accidents avoided benefit, based on damage costs provided by the US Department of Transportation, is $13.6 million discounted over a 30-year period	A drive down crane float would eliminate nearly 17,000 hours of walking back and forth between vehicles and vessels annually and 250 injuries over the next 30 years.	Page 14-18 BCA Tabs 1,2,4,5
		Economic Activity		The value of increased shore processing due to crane dock and drive down float	Increased shore processing and direct sales equaling $18 million discounted over a 30-year period	Page 19-20 BCA Tabs 1,2,7
		Emission Reduction Benefit		The CO_2 emission reduction value is projected to be $32,650.	Fishermen can forgo a 68-nautical mile round trip distance between a further drive down dock.	Pages 21-22 BCA Tabs 1,2,6
		Increased Freight Activity		Increase freight by hundreds of thousands of pounds annually	Increased volumes of construction materials, boat parts, seafood mariculture, subsistence fish, sports fish, yacht provisions	Pages 23

Results of Benefit-Cost Analysis

The BCA for this project was prepared according to Benefit-Cost Analysis Guidance for Discretionary Grant Programs.

The proposed development of the Juneau Aurora Harbor Drive Down Float Project will result in a variety of monetizable benefits, the sum of which exceed the project costs considered in this analysis.

Table 3 summarizes the findings of the BCA. The ratio of monetized benefits to costs (B/C ratio) is 5.0 at the 7% discount rate. The following sections describe the costs and benefits used to calculate the values displayed in the table below.

Table 3. Benefit-Cost Analysis Summary Results

Measure	Discounted at 7%
Total Benefits	$43,065,893
Total Costs	$8,608,561
Benefit-Cost Ratio	**5.00**

The results of the BCA are presented using the cash flows that occur over the analysis period (2027–2056) under the discount rate of 7%. The discount rate is used to discount future cash flows to the present. The discount rate takes into account the time value of money and the uncertainty associated with future cash flows (put simply, the principle of discounting works on the assumption that a dollar today is worth more than a dollar a year or more in the future). The discount rates of 7% follow the guidance of OMB Circular A-4.

Benefits

Value of Travel Time Saved

Travel to and from vehicle on foot

A significant benefit of developing the Juneau Aurora Harbor Drive Down Float in Juneau is the time saved by the fishermen located in Aurora and Harris harbors. These commercial fishermen will longer have to access their vessels primarily by foot, carrying all gear components by hand, or in a harbor-provided handcart.

Gear Changes

Approximately 100 fishing vessels in Aurora, Harris, and Douglas harbors change their gear an average of six times per year to account for the changing seafood catch opportunities.[3] This is slightly more than the average gear change rates for other areas due the proximity to the Douglas Island Pink and Chum (DIPAC) hatchery and the need to change out mesh size on gear to take advantage of the DIPAC fishery. The average fishing vessel takes an average of eight hours to conduct a gear change, typically with a skipper and two crew members. By being able to move the fishing vessel to a nearby float, and drive down a vehicle loaded with gear to expedite the gear change process, fishermen estimate that they will be able to save 50% of the time a single gear change event requires. An additional 50 fishermen use Harris, Aurora, and Douglas harbors only in the summer; and approximately 100 transient vessels use the area in a limited capacity.
The assumptions involved are presented in Table 4 below:[4]

Table 4. Value of Time Saved with Drive-down Dock: Gear Changes

Measure	Count
Average gear changes per average fisherman annually	6
Average hours per gear change	8
Total persons needed per gear change	3
Total hours spent annually for 6 changes per vessel	144
Total time savings using drive down dock	50%
Total annual time savings in hours for vessels gear change: All Vessels	**9,300**
Total annual savings for vessels gear change in 2021 dollars	**$504,977**

[3] Interviews with fishermen in the study area.

[4] Figures are based on interview data with fishermen in project area. Note that summer only fishermen are calculated at 5/12th area use, while transient fishermen are calculated at 1/12th impact. To calculate the transportation/time cost benefits associated with the proposed development of the drive down float, the analysis uses an average Alaska skipper wage from the Occupational Employment and Wage Statistics Alaska-specific datasets produced by the US Bureau of Labor Statistics in 2021, combined with BLS fully loaded employer costs for fishermen.

Some of the loading and unloading events for commercial fishing activities in the Aurora and Harris harbors are listed below:

- Loading and unloading of crab and shrimp pots during summer and fall Dungeness crab, winter Tanner and king crab, and fall spot prawn seasons.
- Loading and offloading salmon fishing gear throughout the summer gillnet season, and the summer and winter troll fisheries.
- Loading and unloading gear and supplies from March through November during halibut and black cod IFQ longline season.

Mechanical Events

Enabling major in-water maintenance and upgrade projects like engine and other major equipment replacements.

The drive down float would also benefit fishermen in other ways. In addition to the need for annual gear changes, fishermen can expect a certain amount of annual wear and tear on the mechanical components of their vessels that must be fixed throughout the year. Again, these events require the skipper and any service workers to make extensive trips on foot between the parking lot and vessel in need of repair.

The fishing vessels in this area assume an average of 3.5 mechanical "events" throughout the year that must be attended to. The average fishing vessel in the project area takes approximately eight hours to fix, typically with a skipper and up to two workers, either crew or marine service staff.[5] By being able to move the fishing vessel to a nearby float and drive down a vehicle loaded with tools and replacement parts, fishermen estimate that they will save 50% of time spent for each mechanical event. To calculate the transportation/time cost benefits associated with the proposed development of the drive-down float, the analysis uses an average Alaska skipper wage from the Occupational Employment and Wage Statistics Alaska-specific datasets produced by the US Bureau of Labor Statistics, combined with BLS fully loaded employer costs for fishermen. Analysis assumes 100 year round fishermen, 50 that use the area in the summer months only, and 100 transient commercial fishermen visit the area during the commercial fishing season.

The assumptions involved are presented in Table 5 on the following page.[6]

[5] Interviews with fishermen in the project area.

[6] Figures are based on interview data with fishermen in project area.

Table 5. Value of Time Saved with Drive-down Dock: Mechanical Work

Measure	Count
Average mechanical per average fisherman annually	3.5
Average hours per mechanical	8
Total hours spent annually for 3.5 mechanicals per vessel	84
Total time savings using drive down dock	50%
Total annual savings in hours by fishermen for mechanicals: All Vessels	**5,425**
Total annual savings for fishing boat mechancials 2021 dollars	**$294,570**

Additional Efficiencies

Trip provisioning, etc.

The drive down float would provide additional opportunities for efficiencies. Inspected passenger vessels and documented commercial fishing vessels that operate more than 12 miles from shore are required by federal law to carry an inflatable life raft that must be inspected annually, which means two trips (coming and returning) with the heavy life raft for inspection purposes. Captains and crew would likely use the drive down dock for this task, saving time and bodily wear and tear. Also, when heading out for longer periods at sea, fishermen purchase groceries and need to transfer these items to their vessels. Again, these events require the skipper and any service workers to make extensive trips on foot between the parking lot and vessel. Some provisioning operations are smaller, but others are more extensive. The project team spoke with one captain with a larger vessel who also uses his vessel for scientific charters. "Six to eight times per year I purchase approximately $2,000 worth of groceries that must be brought down the ramp one hand cart at a time."

Major provisioning occurs occasionally throughout the season. For the purposes of this analysis, we will assume that an average of 10 significant grocery or supply shopping trips occur annually, and take captain and crew 30 to 45 minutes to move from vehicle to vessel using ramps and hand carts.[7] Inspected passenger vessels and documented commercial fishing vessels that operate more than 12 miles from shore are required by federal law to carry an inflatable life raft that must be inspected annually, which means two trips (outgoing and returning) with the heavy life raft for inspection purposes. Captains and crew would likely use the drive down dock for this task, saving time and bodily wear and tear. By being able to move the vessels to a nearby float, and drive down a vehicle loaded with items, fishermen estimate that they will be reduce time spent by 90% for these events. An additional 50 fishermen use Harris and Aurora harbors in the summer. The

[7] Interviews with fishermen in the project area.

analysis assumes that this group would use the drive down float during the summer season to make significant supply runs; while an additional 100 transient commercial fishermen would use the float in a more limited way. To calculate the transportation/time cost benefits associated with the proposed development of the drive-down float, the analysis uses an average skipper wage from the Occupational Employment and Wage Statistics Alaska-specific datasets produced by the US Bureau of Labor Statistics, combined with employer costs for fishermen. The assumptions involved are presented in Table 6 below:

Table 6. Value of Time Saved with Drive-down Dock: Other (provisioning and inspections)[8]

Measure	Count
Average additional provisioning trips per vessel annually	12
Average time per parking lot to vessel expended (minutes)	38
Total hours spent annually for 12 significant equipping trips per year	7.6
Total time savings using drive down dock	90%
Total time saved in hours for all commercial provisioning	**1,767**
Total annual savings for fishing boat provisioning events 2021 dollars	**$103,688**

Methodology: To calculate the transportation cost benefits associated with the proposed development of the drive-down float, the analysis uses an average skipper and crew wage developed by the Occupational Employment and Wage Statistics Alaska-specific datasets produced by the US Bureau of Labor Statistics, combined with employer costs for fishermen. The average captain and mates (occupational code 53-5021) wage is $47.62. The average sailor (occupational code 53-5011) wage per hour is $30.19. According to BLS, this wage represents 66.3% of fully loaded fishermen costs, so the cost were inflated to reflect the true value of travel time saved. Wage values are assumed to increase annually based on the Consumer Price Index inflation estimates, so that later years have slightly higher rates.

Table 7. Labor Travel Time Saved Due to Drive Down Float

Measure	Discounted at 7%
Value of time saved for gear changes, provisioning, & mechanical work: Year 1: 2027	$ 677,797

[8] Figures are based on interview data with fishermen in project area.

Safety Benefits

By creating the Aurora Harbor Drive Down Float, local fisherman will be able to save nearly 17,000 hours annually of walking back and forth between their vehicles in the parking lots and vessels in the harbor, often with loads of heavy or unwieldy objects. The average age of a fishing permit holder in Alaska is 52[9], and all the work that is proposed to be done using the drive-down dock and the cranes is primarily done on foot using the ramp and wheelbarrows (or carried by hand). This requires a significant amount of manual labor for older skippers and crew, especially in inclement weather across a wet dock, and injuries are common. Moreover, these types of activities become **especially dangerous** when the tide is low and ramps become too steeply angled to use safely.[10] Currently, some ramps are 60 feet long. ADA compliance for new construction calls for a minimum of 80-foot-long ramps. At a low tide, the ramp is at a grade of 56%, or 29 degrees. For comparison purposes, in San Francisco where the streets are known to be quite steep, the most extreme stretch is a 40% grade (but only for 40 feet).[11] The ramps that local fishermen in Juneau use have much steeper grades at low tide, and for a longer distance. Most fishermen interviewed had experienced some type of injury on this ramp while moving significant loads.

Here is a typical example: "I had an accident last February. I smashed my finger and required 10 stitches. I was taking a load of supplies to my boat, and the cart just got away from me. It was low tide and bad weather."

Hand cart used by fishermen in project area to bring items to vessel


Image of pedestrian ramp in project area fishermen use to bring items to and from their vessels

[9] Changes in the Distribution of Alaska's Commercial Fisheries Entry Permits, 1975-2021 CFEC Report 22-02N Prepared by Caitlin Stern, Brad Robbins, and Daniel Strong March 2022 https://www.cfec.state.ak.us/RESEARCH/22-02N/CFEC_22-02N.html

[10] Information is based on interview data with fishermen in project area.

[11] https://en.wikipedia.org/wiki/Filbert_Street_(San_Francisco)

The Juneau Aurora Harbor Drive Down Float project directly addresses user and vessel safety concerns. The crane dock is frequently very congested, both on the waterside and on the dock surface area. The existing dock face is 150 feet long, but the inner portion is shallow at low tides, which creates hazards for maneuvering and already moored vessels. Also, the turning basin in front of the existing south face is not large and is subject to strong and swirling currents. This frequently makes getting to the dock face difficult for larger vessels like tenders and limit seiners, particularly if there is already a vessel tied up along the dock.[12]

The safety benefits should be considered as one of the most significant impacts to this project. Approximately 100 local fishermen and 200 additional crew members use the project area year-round, in addition to the 150 visiting fishermen and crew who use the project area transiently or only in the summer. Combined these fishermen spend approximately 17,000 hours moving supplies between the parking lot and their vessels that could be avoided with a drive-down ramp.

Safety data indicates that the total benefit of avoided injuries is expected to be $12.1 million over the 30-year scope of this analysis. Injury data was calculated in two ways, with a very similar result:

Accidents Per 1,000 hours

Based on interviews with local commercial fishermen, there appears to be one minor accident (not resulting an injury) every 1,000 hours of fully loaded dock traversing activity, one minor accident every 2,000 hours that requires light medical care, and one incapacitating accident every 35,000 hours.[13] Using these safety numbers, an estimated 17 non-injury accidents occur annually without the drive down float, 8.5 minor accidents occur, and 0.49 incapacitating accident occurs annually, that would be displaced by the infrastructure upgrade.

Accident Data Survey

In February 2023, the City and Borough of Wrangell hired Rain Coast Data to develop a survey to collect accident data.[14] While this data was focused on a harbor with significantly more safety issues, the user group was in many way

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[12] Fisherman support example: "The existing dock face is sometimes hard to maneuver in strong tide situations, and the inner portion near the old wood dock is too shallow at low tide for many boats, including mine. Completing the dock on the north side will be a big plus." Ian Fisk. Primo Prawns.

[13] An incapacitating injury is an injury that prevented the injured person from walking, working, boating, or normally continuing the activities he or she was capable of performing before the injury occurred.

[14] Those who rent moorage space in Wrangell Harbor Basin were asked to participate in the survey, along with others that use the area, but moor their vessels elsewhere. A total of 104 Wrangell harbor users and vessels owners participated in the survey. Based on the response rate, the survey has a 95% confidence level with a confidence interval of 8.5%. Harbor users were asked to think about their use of the area over the past three years, and provide data on the annual number of accidents they experienced that were caused by poor harbor conditions, along with vessel damage estimates. Data was cleaned and coded to eliminate any outlier responses. The survey was conducted in February 2023.

similar, and represents a larger group. Rain Coast Data projected that, due to the better conditions of the Aurora/Harris harbors, accidents were likely to occur at 1/25th the rate of the Wrangell study area. Based on that analysis, fishermen who have moorage in the Aurora/Harris harbors would have an average of 0.0989 slips, falls, and other accidents annually that **do not** result in an injury; 0.0438 accidents that result in a **minor injury**; and 0.00268 annual accidents that result in an **incapacitating injury**. Those that use the harbor, but do not moor there, reported lower accident rates. Using these safety numbers, an estimated 18 non-injury accidents occur annually without the drive down float, 8 minor accidents occur, and 0.47 incapacitating accident occurs annually, that would be displaced by the infrastructure upgrade. See table 8:

Table 8. Annual Accident Data

Accidents, by Type	Average Accidents by Year-Round Renter	Average Accidents by Commercial Fisherman Transient	Annual Accidents Avoided
Accident Experienced, No Injury	0.10	0.04	17.8
Minor Injury	0.04	0.02	7.8
Incapacitating Injury	0.003	-	0.47

The variables that have been used in this analysis, with the value that was selected for each, are presented in Table 9 and below.

Table 9. Assumptions for a Safety Data

Variable	Variable Value
Year-Round Commerical Fishing Vessel Renter	100
Seasonal Commercial Fishing Vessel Renter	50
Transient Commercial Fishing Vessel	100

Year-Round Harbor Renters: Currently 100 commercial vessels have year-round moorage in the Aurora Harbor and adjacent harbor areas (Harris Harbor, Douglas Harbor). Since those renting space in the harbor could have multiple individuals associated with each vessel, the analysis assumes that every vessel has an average of 1.5 regular users.

Seasonal Renters: In the summer, additional moorage is rented, bringing an estimated additional 50 commercial fishing vessels that rent seasonal space. The analysis assumes

that these users only use the project area for five months of each year, so the accident ratios are reduced by 5/12 (i.e. they are assumed to use the harbor for only five months of the year). The analysis assumes that every seasonal vessel has 1.2 users.

Non-Renting Harbor Users: To estimate non-renting commercial fishing vessel harbor users, analysts estimated a very conservative number of 100 vessels. Hundreds of transient commercial fishing boats use the project area, but the exact number varies year to year. Use of this group is considerably less, and would only result a small amount of accidents. The analysis assumes that every transient commercial fishing vessel has 1.2 users.

Adding a drive down float will remove a significant safety hazard for Juneau downtown fishermen. The monetized value of the accident and injury data are provided by the US Department of Transportation. Utilizing Table A-1: Value of Reduced Fatalities and Injuries provided in the Appendix A: Recommended Parameter Values of the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, published January 2023. As presented in Table 10, the 30-year economic value of preventing accidents and injuries for commercial fishermen is $13.6 million in 2021 dollars, discounted.

Table 10. Value of Accidents and Injuries Avoided

	Annual Savings
Year-Round Commerical Fishing Vessel Renter	$1,296,010
Seasonal Commercial Fishing Vessel Renter	$216,002
Transient Commercial Fishing Vessel Area User	$24,812
Injuries Avoided (discounted at 7%, 30-year savings)	**$13,597,003**

Value of Avoided Accidents and Injuries Savings

The discounted present value of accidents avoided is expected to be $1 million in the initial (discounted) year the value of avoided accidents and injuries is realized, and $13.6 million over the 30-year scope of this analysis. See Table 11 below:

Table 11. Monetary Value of Avoided Accidents and Injuries

Year	Annual Nominal value of Accidents Avoided in 2021 Dollars	Discounted Present Value of Accidents Avoided
2027	$1,536,823	$1,024,050
2028	$1,536,823	$957,056
2029	$1,536,823	$894,445
2030	$1,536,823	$835,930
2031	$1,536,823	$781,243
2032	$1,536,823	$730,134
2033	$1,536,823	$682,368
2034	$1,536,823	$637,727
2035	$1,536,823	$596,006
2036	$1,536,823	$557,015
2037	$1,536,823	$520,575
2038	$1,536,823	$486,519
2039	$1,536,823	$454,690
2040	$1,536,823	$424,944
2041	$1,536,823	$397,144
2042	$1,536,823	$371,163
2043	$1,536,823	$346,881
2044	$1,536,823	$324,188
2045	$1,536,823	$302,979
2046	$1,536,823	$283,158
2047	$1,536,823	$264,634
2048	$1,536,823	$247,321
2049	$1,536,823	$231,142
2050	$1,536,823	$216,020
2051	$1,536,823	$201,888
2052	$1,536,823	$188,680
2053	$1,536,823	$176,337
2054	$1,536,823	$164,801
2055	$1,536,823	$154,019
2056	$1,536,823	$143,943
Injuries Avoided (discounted at 7%, 30-year savings)		**$13,597,003**

Economic Activity

Increase in Shore Processing and Direct Marketing

A significant problem affecting the Alaska economy is the transport of raw, unprocessed resources from the state for primary and secondary processing in other states and countries.

Currently in Southeast Alaska, most salmon is headed, gutted, frozen, and sent to countries such as China for secondary processing. Because this work is taking place overseas, jobs and economic activity created by local shore processors and direct marketers will be new economic activity, rather than transferring shore processing or marketing activity from other U.S. facilities. A significant monetizable benefit of the drive down float development would be the increase of shore processing and direct marketing. Juneau is well positioned to invest in value-added manufacturing and develop new businesses in this area. Indeed, the crane dock that has already been completed is responsible for a huge increase in shore processing and direct marketing.[15] A small salmon smoker called Taku Smokeries was looking to expand in the face of growing demand. They started using the crane dock to offload fish for transport to a small, offsite processing facility - it was literally a "garage start-up." Taku Smokeries grew to a substantial mid-sized Alaska seafood processor with $20+ million in annual sales. It owns two substantial regional subsidiaries and employs more than 100 people during peak season. Another success story is Alaska Glacier Seafoods. Father-son team of Mike and Jim Erickson began buying from local fishermen and offloading the boats at the crane dock. Alaska Glacier Seafoods has its own dock and buys fish from dozens of fishermen. Both are local Juneau start-ups. Neither could have gotten started or grown as they have without the public- owned infrastructure of the crane dock.[16]

One of the primary reasons that seafood harvests have become more significant over time in the Juneau area is due to the work of a local hatchery, Douglas Island Pink and Chum, Inc. (DIPAC). The hatchery is located near the project area and ensures that instead of increasing shore processing and direct marketing at the expense of other businesses,

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[15] "Taku River Reds (TRR), a relatively small, family owned, direct-to-market fishing business … is very dependent on the public crane dock between Harris Harbor and Aurora Harbor near downtown. The fish we offload at the site goes to one of our processors and some is shipped fresh to our customers from the Juneau airport. The dock has been essential to our business. Unfortunately, it has become more and more congested over the years, with lots of competing users. We know that the city has considered expanding the dock for many years, though there has never been money available. Building out the north side by Aurora and adding more cranes would be an enormous improvement for our business." Taku River Reds, 2018.

[16] "The crane dock was extremely important for us when we were starting Alaska Glacier Seafoods back in 1996. If fact, without the dock I don't think we could have built our company." Mike Erickson, President, Alaska Glacier Seafoods.

DIPAC is working to grow the total amount of salmon in the area. This increases the level of opportunities for new businesses to access the market. The 2021 permitted incubation capacity of this facility was 135 million chum salmon, 1.5 million coho salmon and 1.25 million Chinook salmon eggs.[17] The ex-vessel value of DIPAC Salmon harvested in the common property commercial fisheries has grown dramatically over time, from $1.6 million in 2003 to $20.4 million in 2017, with a 2021 cumulative ex-vessel value total of $200 million. The Juneau Aurora Harbor Drive Down Float will provide crucial facilities to service the Juneau fishing fleet that are catching DIPAC fish, while increasing the opportunities for local entrepreneurs to engage in shore processing and direct marketing.

Additional working space, twice as many cranes and a drive-down float would be a significant boost for processors and direct marketers. There are millions of more pounds of salmon that could potentially be accessed by local operators. The development of the crane dock and the drive-down float are projected to increase onshore processing in Juneau by more than 500,000 pounds annually, which would generate an expected $2 million per year in first wholesale output, increased direct marketing, and growth of existing shore processing operations. In 2020, total production of shorebased processors and direct marketers engaged in custom processing was 76.1 million pounds in the region, with a value of $271 million.[18] It is expected that the drive down float would increase this overall amount by 0.75%, for 570,400 additional pounds of seafood product direct marketed and processed in the region, for a total annual value of $18 million over 30 years (discounted at 7%).

Table 12. Increase in Shore Processing and Direct Marketing: One Year[19]

Measure	Annual Benefit
Increase in Direct Marketing Annually	$662,083
Development of New Shore Processing Annually	$1,368,257
Increased Processing and Sales (discounted at 7%, 30-year)	**$17,963,377**

[17] http://www.adfg.alaska.gov/static/fishing/PDFs/hatcheries/annual_management_plans/2021_amp_macaulay.pdf

[18] Production Shorebased Processors and Direct Marketers custom processing with Shorebased Processors The State of Alaska, Department of Fish and Game

[19] SeaFisk Consulting and Management LLC. Memorandum to the City and Borough of Juneau Docks and Harbors. Benefits versus Costs of Crane Dock Expansion. 2015.

Value of Emissions Reduction Benefits

Reduction of CO2 Emissions

One of the benefits of the Aurora drive down float is that it will allow commercial fishing vessels to forgo having to travel to the Auke Bay drive down float, 34 nautical miles away (one-way).

Fuel Use Survey

Rain Coast Data has surveyed regional fishermen about fuel use and vessel speed by vessel type. According to survey respondents, those with commercial fishing vessels have an average cruising speed of 10 knots per hour and use 4.1 gallons of diesel per hour when underway.[20]

Of the 250 commercial fishing vessels previously identified in the project area, this analysis assumes that 80 travel to Auke Bay one time each year to use the drive down float. By avoiding this trip, 2,230 gallons of diesel use would be avoided on an annual basis. Moreover, the owners and crew of these fishing vessels would also avoid having drive vehicles to the Auke Bay float. This results in an additional savings of 154 gallons of fuel used annually. The total probable metric tons of CO_2 emissions avoided is 24.27 metric tons annually, or 728 metric tons avoided over 30 years.

Table 13. Foregone Emissions Savings

Foregone CO2 emissions	Value
Avoided CO2 emissions (discounted at 3%)	**$32,650**
Probable Metric tons CO2 avoided	**728 metric tons**

The team used "probable estimates" in place of "maximum estimates" to provide a conservative estimate of emissions reductions. It is possible that emissions reductions will be even greater. The monetized value, per metric ton, of the damage caused by emissions are provided by the US Department of Transportation. Using Appendix A, Table A-6 of the Benefit-Cost Analysis Guidance for Discretionary Grant Programs, $ 32,650 in future savings will be realized during the first 30 years of the project if it is developed.

Value of CO2 Savings

An estimated 704 metric tons of CO_2 air emissions is expected to be avoided through implementation of this project. The discounted present value of CO_2 avoided is expected to be $1,315 in the initial year it is realized (discounted present value), and $31,844 over the 30-year scope of this analysis.

[20] Survey conducted in February 2023, and was focused on Wrangell commercial fishermen.

Table 14. Monetary Value of Avoided CO2

Year	Probable Metric tons CO2 avoided	2021 Value of CO2 value per metric ton	Nominal value of CO2 avoided	Discounted present value of CO2 avoided
2027	24.27	$61	$1,480	$1,315
2028	24.27	$62	$1,505	$1,298
2029	24.27	$63	$1,529	$1,280
2030	24.27	$65	$1,577	$1,283
2031	24.27	$66	$1,602	$1,264
2032	24.27	$67	$1,626	$1,246
2033	24.27	$68	$1,650	$1,228
2034	24.27	$69	$1,675	$1,210
2035	24.27	$70	$1,699	$1,192
2036	24.27	$72	$1,747	$1,190
2037	24.27	$73	$1,772	$1,171
2038	24.27	$74	$1,796	$1,153
2039	24.27	$75	$1,820	$1,134
2040	24.27	$76	$1,844	$1,116
2041	24.27	$78	$1,893	$1,112
2042	24.27	$79	$1,917	$1,093
2043	24.27	$80	$1,942	$1,075
2044	24.27	$81	$1,966	$1,057
2045	24.27	$82	$1,990	$1,039
2046	24.27	$84	$2,039	$1,033
2047	24.27	$85	$2,063	$1,015
2048	24.27	$86	$2,087	$997
2049	24.27	$87	$2,111	$979
2050	24.27	$88	$2,136	$961
2051	24.27	$88	$2,136	$933
2052	24.27	$88	$2,136	$906
2053	24.27	$88	$2,136	$880
2054	24.27	$88	$2,136	$854
2055	24.27	$88	$2,136	$829
2056	24.27	$88	$2,136	$805
Total Savings over 30-year period, discounted at 3%				**$32,650**

Notes: CO_2 emissions The 2021 value per metric ton came from Table A-6 of the 2023 BCA guidance document. Pages 40-41 of the BCA guidance document indicates that CO_2 emissions should be discounted at 3%.

Foregone Maintenance of Moorage Floats

The existing floats in Aurora Harbor that would be removed have a $550,000 replacement value to todays construction standards with todays dollars. The float and gangway were replaced in 2009 and have 20-30 years of service life remaining. They would be salvaged

and reinstalled at some other facility in Juneau. Because they would be used elsewhere in Juneau, there is no foregone maintenance on the current floats.

Increase in Freight

In addition, we qualitatively discussed the following non-monetized benefit:

Increased Freight: Currently the Aurora crane dock is used to move several categories of freight. Because using the crane dock for freight is arduous, it is expected that the volumes of freight moving through a new drive down float in Aurora Harbor will increase dramatically in future years. These include the following:[21]

- **Construction Materials -** for home building, cabin building, and lodge construction: Near the Juneau area there are dozens of islands, inlets, and rivers that would use the new drive down float to move construction material. Materials that would be moved include gravel, wood, sheetrock, construction equipment, and additional construction supplies. These would be transported to areas like Taku River, Spoon Island, and Lucky Me during the summer months.
- **Vessel Restoration Materials** - The new drive down float will be located directly adjacent to the the shipyard. For this reason, the crane dock is currently used to bring in vessel reconstruction materials. Having a drive down dock will make this process significantly easier, and facilitate bringing in wood, fiberglass elements, engines, propellers, electronics, refrigerations components, and the many other freight items that go into the upkeep of the local fleet.
- **Increased Seafood and Kelp Volumes** - Last year the crane dock was used to move 186,000 pounds of seafood and kelp to market. By doubling the crane capacity, and allowing the product to be moved directly onto vehicles, this is expected to triple the volume of seafood project moved through this area. Mariculture is a quickly growing industry as oyster farms and seaweed harvests are growing in popularity.
- **Subsistence Fish** - Subsistence is an important part of supplying Alaska Native households with traditional foods. It is expected that the drive down float will be used to unload subsistence harvests and deliver fish to elders.
- **Sports Fishing** - Fishing charters is an important contributor to the Juneau economy. The ability to off-load charter fish via a drive down float, rather than carrying the fish over the docks following a charter will be a significant help to the charter industry.
- **Yacht Provisioning** - In 2020, 63 super yachts, 115 ft or larger, visited Juneau and re-provisioned, according to the Marine Exchange of Alaska. Hundreds of smaller yachts also visit the community. Yacht provisioning is most easily done using a drive down dock, as hundreds of thousands of pounds of food, water, and other supplies are onboarded in the Juneau community. The drive down float is expected to be used extensively for this purpose.

[21] All information for this section came through interviews with current users of the crane dock.

Costs

Capital Expenditures

Design, permitting, and construction of the Juneau Aurora Harbor Drive Down Float Project are scheduled to occur over an 18-month period from 2025–2026. The estimated construction and design costs for all elements of the project is $11.2 million.

To account for inflation, capital costs and maintenance costs were first adjusted from 2023 nominal dollars to the baseline 2021 real dollars using GDP deflators from the Bureau of Economic Analysis. Future costs were then further discounted using a 7% discount rate to the baseline 2021 dollars. For the sake of this analysis, capital costs have been spread evenly over the duration of the 18-month construction period.

Operations and Maintenance Costs

The analysis assumes annual maintenance costs will be approximately 1.5% of capital cost every 5 years and 3.72% of capital cost every 15 years.[22]

Table 16. Operations and Maintenance Costs

Assume completion in 2026	Discounted at 7%
Construction Costs (discounted at 7%)	$8,262,648
O&M Costs (discounted at 7%)	$345,913
Total Costs	**$8,608,561**

These assumptions were developed by Northern Economics as a standard starting point for Alaska marine service yards and have been reviewed by the engineering and design team.[23]

State of Good Repair and Residual Value

The residual value of the project assets is characterized as a state of good repair benefit. The project fully depreciates in 2056, which is 30 years after the expected first operation year of 2027. Given that the assumed lifespan of the capital investment is 50-years, residual values were calculated as 60% of the original capital value.

[22] Northern Economics "Petersburg Waterfront Master Plan: Rate Study and Financial Considerations" presentation by Mike Fisher on October 4, 2017 at the AAHPA Annual Conference.

[23] Residual Value: Given assumed 50-year lifespan of capital, calculated residual value as 20% of original capital value.