Executive Summary

The marine ecosystems in and around Prince William Sound (PWS) remain economically and ecologically the hardest hit region in the wake of the *Exxon Valdez* Oil Spill (EVOS). One of the positive legacies of the spill was the construction of the Alaska SeaLife Center in Seward, which opened in 1998 to conduct research, wildlife response and public education. Twenty years of research by the Alaska SeaLife Center (ASLC) and others have shown that true recovery may still be decades away. To continue our research and restoration, ASLC must repair, replace, and improve our building infrastructure, life support, and research support systems. Support from the *Exxon Valdez* Oil Spill Trustee Council (EVOSTC) for these projects will benefit marine research and restoration as well as educational opportunities in the spill-impacted region for the next 20 to 50 years. Updated and expanded facilities are key to ASLC's mission to continue serving as a significant resource for generating and sharing knowledge that promotes understanding and stewardship of Alaska's marine ecosystems.

About ASLC

The Alaska SeaLife Center is a uniquely positioned cold-water research organization. It is Alaska's only marine mammal rehabilitation center and the state's only facility accredited by the Association of Zoos and Aquariums. The concept of the Center originated in the 1990's with the establishment of the Seward Association for the Advancement of Marine Science (the registered not-for-profit organization that operates as the ASLC). The Center opened to the public in May 1998, and welcomes over 165,000 visitors annually from all over the world. We celebrated our 20th anniversary in 2018.

To achieve our mission of generating and sharing knowledge to promote understanding and stewardship of Alaska's marine ecosystems, the ASLC has three focus areas: (1) research, (2) education, and (3) wildlife response. Our programs are recognized within Alaska and nationwide for contributions to scientific understanding of marine mammals, birds, and fish, as well as high standards of excellence in education, conservation, and animal care and rehabilitation.

The Alaska SeaLife Center functions as a marine research facility, designed with flexibility to allow for changes in research priorities. In the first 20 years, most studies focused on declining populations of marine mammals and seabirds in the North Pacific, including Steller sea lions, harbor seals, and eiders. We have added new research work with ice seals, mussels, and sleeper sharks, to name just a few species. ASLC scientists collaborate with a broad group of scientists and resource managers to collect and analyze data. As a lead organization in the Alaska Region Marine Mammal Stranding Network, we operate the only permanent facility in the state licensed to rescue and rehabilitate marine mammals. The Alaska SeaLife Center is Alaska's sole public aquarium, with 40,000 square feet of exhibit space designed to educate the public about marine wildlife and associated research. Live animals in naturalistic habitats and a variety of interactive exhibits help visitors understand the significance, processes, and results of research projects conducted at the ASLC and in the field. In addition, in-house distance learning and outreach education programs reach thousands of students in Alaska, the rest of the United States, and abroad.

The Alaska SeaLife Center partners with and supports our local community in several ways—both directly and indirectly—with mission-driven programming and outreach, encouraging involvement to further develop stewardship for our local waters.

- For our youth, ASLC provides a week of lessons at Seward Elementary every spring, gives free admission for all Alaska Vocational Technical Center (AVTEC) students, hosts a weekly free after-school science club for 6th to 12th grade students, and hosts several elementary school classes for field trips to the Center at no cost.
- To help nurture our partnership with our local Government, we provide 60 annual passes to the City of Seward administration. We also provide free tours to the City of Seward Japanese Sister City Program and other events on request.
- The Center hosts an annual reception for boat captains and kayak guides operating out of Seward, not only to help launch the season, also to promote and provide education about our local marine life and ecosystems.
- A highlight for all Alaska residents is free admission once a week from November to February each year. The Center also hosts various free community events such as a Holiday Party, an Easter Egg Hunt, an Easter Sunrise Service, and Seward Chamber's Front Line Trade Show.
- Our dive team volunteers their time to help with the longstanding Polar Bear Jumpoff Festival that takes place in Seward and helps raise funds to benefit cancer research.
- The Center is also home to the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training team, providing training for local groups such as the Kenai Fjords National Park, NOAA, and Alaska Department of Fish and Game.
- Numerous local groups receive auction items from the Center to assist their fundraising efforts, including the Girl and Boy Scout Troops, Tsunami Swim Club, the Seward Seahawks Athletic Booster Club, Seward Chamber of Commerce, American Legion, Seward Music and Arts Festival, Seward Rotary Club, and the Seward Volunteer Fire Department.

History of ASLC and EVOS Trustee Council

The concept of the Alaska SeaLife Center began over 30 years ago, with the initial vision by Seward community leaders to enhance the existing University of Alaska's Seward Marine Center research facilities. Members of both the local and scientific communities identified a need and expressed their support for an expanded research and public education facility in Seward. The concept remained a dream for years with periodic efforts to lobby the University and the Alaska Legislature for funding. In 1990, the Seward Association for the Advancement of Marine Science (SAAMS) was incorporated as a non-profit to pursue this vision.

In 1993, the Alaska Legislature appropriated $12.5 million from the EVOS criminal settlement funds as a state grant to the City of Seward for SAAMS to develop the Alaska SeaLife Center as a "marine mammal rehabilitation center and as a center for education and research related to the natural resources injured by EVOS." Following receipt of the first installment of the state grant funds, SAAMS requested additional funding from the EVOS Trustee Council. And in November 1994, EVOSTC authorized $24.956 million to support the development of research facilities at the Alaska SeaLife Center.

The *Exxon Valdez* disaster drew dramatic attention to the need for improved facilities to treat injured wildlife, as well as to enhance Alaska's collective marine science research infrastructure.

In particular, the disaster brought to light the lack of reliable baseline information on the affected animals and their habitat before the spill. In light of the potential long-term effects, scientists identified a need to establish the capability to conduct research and monitoring on a long-term basis.

We would like to thank the Council for their initial support for the ASLC. We are perhaps the most obvious and successful legacy of the Council's restoration investments over the past 20 years. The initial $24.956 million grant to build the Alaska SeaLife Center has enabled the following outcomes:

- Leveraged over $185m of additional capital investment and ongoing research and education funding from 1998-2018;
- Resulted in over 500 peer reviewed scientific publications and more than 900 other publications;
- Provided education about the marine ecosystem of Alaska to more than 2.5 million visitors and more than 200,000 school children;
- Employed more than 720 people over the years (current staff of 70 FTE and some 30 seasonal staff), trained 300 interns, 36 postgraduate students and over 1,000 volunteers;
- Generated an annual direct income to the Seward and Kenai Peninsula Borough economy that has stimulated multiplier effects as well as indirect, but significant, positive flow-on economic and social effects on local housing, schools, charities, etc.; and
- Established facilities that subsequently rehabilitated more than 200 marine mammals and 275 seabirds, many in the spill-affected area and which are maintained to this day as the only dedicated and 24/7 capable oil spill marine wildlife response facility in Alaska.

Along with other Trustee Council partners and beneficiaries, the Alaska SeaLife Center research projects continue to focus on common interests: Understanding Alaska's unique marine life and ecosystems. The Center's unique geographic location, marine cold-water research facilities, live animal collections, and specialized staff allows for a combination of experimental and field research to:

- Investigate physiological and ecological processes affecting marine animal population dynamics;
- Conduct controlled experiments to understand factors affecting reproductive success and fitness in marine species;
- Monitor marine animal responses to environmental variability and stressors;
- Evaluate human impacts on our marine environment and animal populations; and
- Develop tools to support recovery and restoration of marine resources.

Long-term research and data collection has been a priority of the SeaLife Center's use of EVOS-TC funding, from simple animal surveys to longitudinal video surveillance of area habitats. The Alaska SeaLife Center hosts Alaska's longest-running monthly seabird survey, engaging the community for understanding of our local species, abundance, locations, and other information. These surveys are a valuable resource to citizens and scientists alike as we continue to act as the stewards of our marine ecosystems. Scientists here at the Center also just completed a seabird survey with marine biology students from Seward High School, wondering about seabirds as

indicators of change in the coastal ecosystems, and other factors have on the populations of different species.

The Gulf Watch Alaska exhibit at the ASLC provides opportunity for more than 160,000 annual guests and students to learn more about the larger Prince William Sound and Gulf of Alaska marine environments and the spill impacts. This exhibit is available to travel, and we are excited to facilitate exhibition at partner facilities throughout Alaska.

The remote video-based long-term study at the Chiswell Island Rookery complements the work of Gulf Watch Alaska by sharing Steller sea lion and other data from the spill-impacted region, collected early in the response and recovery and continuing today. As a result of the significant positive impact of the Chiswell project, proposals have also been submitted for the implementation of a long-term video capture of seabird populations around Resurrection Bay and Prince William Sound.

In addition to these long-standing projects, our researchers have also developed and completed a variety of projects exploring the effects of oil, including:

- Sensitivity to hydrocarbons and baselines of exposure in marine birds on the Chukchi and Beaufort Seas
- Photo-enhanced toxicity of oil to various immune parameters in three avian species
- Photo-enhanced toxicity of dispersed vs burned crude oil to arctic mussels

The role that EVOS-TC has played in the Center's history has shaped our research over the past twenty years, and will continue to significantly impact our research for the next twenty. ASLC scientists actively ask these questions and use the local marine mammals, seabirds, fish, and invertebrates as windows into studying the complex ecosystems they inhabit. We are eager for opportunities to build additional capacity in existing projects like the Chiswell Monitoring System or studying long-term oil impact on mussel populations, and using creative ways to continue our education efforts with the public.

EVOSTC Funding Proposal – *based on 4 areas of need*

The Alaska SeaLife Center is a complex facility that relies on numerous physical and biological systems for the research and care of marine wildlife. ASLC is located directly on the powerful weather-thumping edge of Resurrection Bay, requiring a high level of owner care and management. Operating continually for more than 20 years, critical building systems and infrastructure require increasingly costly maintenance due to operating in a harsh saltwater environment and changes in building codes. Collectively, these projects represent facility improvements vital to the long-term sustainability of the ASLC. Without addressing these needs, the Alaska SeaLife Center will not be able to operate safely for animals, staff and visitors.

Our visitor education programs, which translate our research to the public, have given many thousands of local people the opportunity to develop their knowledge of our area, enabling further stewardship of Alaska's marine ecosystems. But ASLC's guests are always eager to learn more, and we have now reached a critical stage in the Center's development.

Continuing the success of our research, combined with interactive learning opportunities that promote our ability to educate, inform and inspire action to help conserve species and habitats

requires an emphasis on repairs of indoor and outdoor aspects of the habitats, life support systems, and gathering places that make the Center a year-round community resource.

Our public spaces are equally important to consider in these endeavors to increase efficiencies and safety measures, so that we may continue the variety of activities that enable the research, rehabilitation of animals, educating our community, and promoting stewardship of Alaska's marine ecosystems.

Perhaps most important, expanded infrastructure will support our ability to be an interface between researchers, communities, regulators, resource managers, students, and educators near and far to continue implementing world-class EVOS-related research and education.

1. Research Infrastructure. *We are requesting 100% funding for these projects which are specific to our research programs and in complete alignment with the EVOS restoration plan.*

The broader impacts of this request lie in the Alaska SeaLife Center's ability to support research and wildlife rehabilitation while acting as a focal point for marine science outreach and education.

The ASLC was designed for flexibility as research priorities change, and this $689,000 project will allow us and our partners to create and take advantage of opportunities as new technologies bridge geographical distances and the focus sharpens on global climate change, sustainable resource development, and other critical issues facing Alaska's marine ecosystem.

Sea-going research projects are active throughout the year with monthly bird surveys, maintenance on equipment at Chiswell, and the newest study of Sleeper Shark activity, among others. Our vessels are also used to maintain OSHA standards for proficiency of our Scientific Dive Team.

Windows and doors are one of those building components that everyone looks at every day, without really seeing them. As one of the most important components in maintaining the integrity of a building envelope, windows and doors represent a major investment and they are expected to remain in place for 30 years or more. The nature of our climate results in more rapid deterioration problems with leakage, hardware, finish, and even security, requiring repair and replacement more often than one might experience elsewhere.

Our community and education programs sharing research information have given many thousands of local people the opportunity to develop their knowledge of our area, enabling further stewardship of Alaska's marine ecosystems. But ASLC has never been content to rest on its laurels, and we have now reached a critical stage in the Center's development. Research is the life-blood of an institution like ASLC and even more so of the kind of facility it wishes to become. And all this, in turn, requires space. A portion of our unused space needs to be finished for additional research capacity. This space is adjacent to current mammal and fish curatorial areas, and expansion will allow for the growth of research projects, as well as space to store larger research equipment.

2. Critical Water Systems. *We are requesting 75% funding for these projects that are required to maintain seawater and freshwater flows that specifically support research animals and projects. These projects, while scoped individually, are all collectively important to maintain life-support to resident animals and are therefore critical to research programs.*

All species held for scientific studies, aquarium displays, and educational programs depend on a marine life support system that can ensure a consistent supply of clean seawater. In addition to having sufficient seawater intake capacity, it is also critical to have sufficient pumping and storage capacity to distribute that water throughout all labs and animal enclosures and pools. Two 24-inch intake pipes supplying seawater to the Alaska SeaLife Center were originally designed for each to deliver 5,000 gallons per minute (GPM) of seawater into the facility. Our pumping capacity has not achieved this due to aging pumps that have exceeded their useful life, thus requiring replacements.

In 2015, the Center was approved to utilize $98,000 allocated by a grant from the State of Alaska to embark on this $2.4 million project, which provided for the purchase of two complete pump replacements (eleven total needed). We are currently requesting an additional $612,000 from the State of Alaska Capital Funding for the remaining pumps, intake pipe cleaning, and well dredging and repair. In addition, a request to the Murdock Charitable Trust has been made for $528,000 to complete the seawater pump project and improvements to our Freshwater Well pump house, mitigating future flood and storm damage.

3. Building Infrastructure with Research Focus. *We are requesting 75% funding for these building infrastructure projects that have a significant but not exclusive research focus.*

ASLC's primary focus remains on programs and facilities that support the mission of generating and sharing scientific knowledge that promotes understanding of Alaska's marine ecosystems in fresh and interesting ways for visitors. Part of maintaining the accomplishments of our research and education programming includes the security of our network server infrastructure. The network capacity is extensive and supports research data storage and analysis in addition to telephone systems, the accounting database, and other key technologies. Repairs to the habitats and the installation of a safe fire suppression system will maintain critical safety measures and help continue the success of offering interactive learning opportunities that promote our ability to educate, inform and inspire action to help conserve species and habitats. In addition to the $130,000 we are requesting from Murdock Charitable Trust, we are seeking $258,000 from the Trustee Council to support this project.

4. Building Infrastructure. *We are requesting 50% funding for these general building infrastructure projects. 50% of the original capital funding for the Center was provided through EVOSTC funds.*

ASLC is an active member of the Alaska Forum's Green Star program, which supports businesses that wish to practice waste reduction, energy conservation, and pollution prevention through education and technical assistance as part of an award-winning voluntary certification program. In an effort to continue and expand on these practices, and as a result of multiple assessments, it is necessary to repair and replace aspects of our physical building, including replacement of a roof that is not energy efficient and has required repairs since installation,

repairs to windows that have lost their insulating properties, and replacement of doors that have been battered by our unique climate, creating inefficiencies and safety hazards.

Our public spaces are equally important to consider in these attempts to increase efficiencies and safety measures, so that we may continue the research activities that educate our community and promote stewardship. To that end, our welcoming plaza and sidewalk areas have also borne the brunt of Resurrection Bay's severe weather patterns, and multiple areas require significant repairs to maintain safety standards for our staff and visitors. Not a small undertaking, we are requesting $934,500 from EVOS and a combined total of $934,500 from the State of Alaska Capital Funding and Murdock Charitable Trust for the balance of funding for these projects.

Also aligning with the Green Star program, The Center has been working for nearly ten years to reduce dependence on oil and reduce electricity use through energy-efficient heat pumps. We are requesting $209,500 each from the Trustee Council and Murdock Charitable Trust to complete the second phase of this project. Two rooms - which generate so much heat that fire doors are required to be left open and the rooms unsecured - will have new equipment installed to convert this heat and use it elsewhere in the building. Also included is an upgrade of our building automation system to come fully into compliance with other equipment and systems our aged system is not compatible with. This also works as a preventative safety measure, as overheating of these rooms and failure of alarm systems can destroy critical research samples, shorten equipment lifespans, and lead to equipment failure and the loss of vital research data.

Table: Overview of Requested Funding

	EVOSTC		Matching				
Project	**EVOSTC Funds**	**% of total**	**Matching Funds**	**Target Match Org**	**Match Received**	**% of total**	**Project Total**
Research Infrastructure							
- Research Vessel Replacement	$235,000	100%					$235,000
- West Research Portal Repairs	$219,000	100%					$219,000
- Research Space Expansion	$235,000	100%					$235,000
Critical Water Systems							
- Intake Line and Well Repair	$1,542,750	75%	$514,250	*State of AK (2019)*		25%	$2,057,000
- Seawater Pump Replacement	$294,000	75%	$98,000	*State of AK (2019)*	$98,000 (2015, State of AK)	25%	$392,000
- Fresh Water Pump House Barrier	$42,000	75%	$14,000	*Murdock Charitable Trust (2019)*		25%	$56,000
Building Infrastructure with Research Focus							
- Animal Habitat Restoration	$356,250	75%	$118,750	*Murdock Charitable Trust (2019)*		25%	$475,000
- Server Room Fire Suppression	$32,000	75%	$11,000	*Murdock Charitable Trust (2019)*		25%	$43,000
Building Infrastructure							
- Roof, Window and Door Restoration	$367,500	50%	$367,500	*State of AK*		50%	$735,000
- Building Automation System	$409,000	50%	$409,000	*State of AK*		50%	$818,000
- Heat Recovery System	$209,500	50%	$209,500	*Murdock Charitable Trust (2019)*		50%	$419,000
- Plaza and Sidewalk Replacement	$158,000	50%	$158,000	*Murdock Charitable Trust (2019)*		50%	$316,000
Total Funds Requested	**$4,100,000**		**$1,900,000**				**$6,000,000**

The remainder of this document details the individual projects listed in the Table above. Each project was scoped with details, cost analyses, and/or professional external price quotations. Further detail is available on request.

Research Vessel Replacement

MUNSON 28' SERIES / Model 28-41 Utility

At the Alaska SeaLife Center, our ocean-going vessels are the primary tool for many of our field research projects, including the longitudinal Chiswell Observer project 30 miles out in the Gulf of Alaska. Sea-going research projects are active throughout the year with monthly bird surveys, maintenance on equipment at Chiswell, and the newest study of Sleeper Shark activity, among others. Our vessels are also used to maintain OSHA standards for proficiency of our Scientific Dive Team. We have had several different vessels over the years and our vessel Jubatus, a Munson hull design, has been the most useful of all our vessels supporting science. We propose to buy a 28-foot Munson monohull landing craft to take the place of an older fiberglass boat (Sea Searcher) that is presently in need of significant repairs including engine replacement. This model, containing both a bow door and a cabin, will accommodate all of our current research needs including access to remote beaches and islands, scientific diving, and research animal sampling.

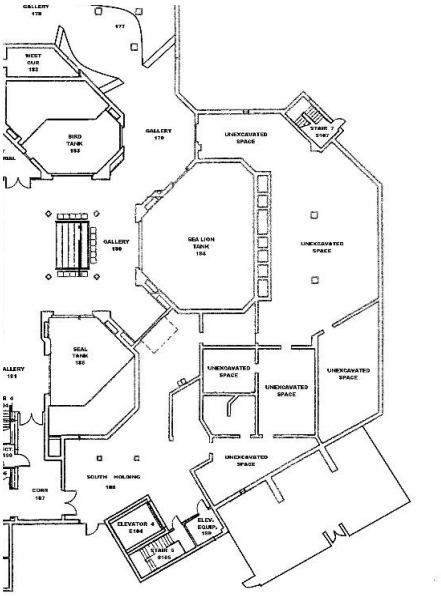
Estimated Cost: $235,000

West Research Portal Repairs

The west side of the first floor of the Center houses research and veterinary space, including indoor and outdoor laboratories and animal holding facilities. Each indoor space contains entry/exit points to the outside, both overhead doors and standard entry doors. These doors are exposed to the elements and endure the harsh weather conditions, saltwater spray, and heavy winds on the shores of Resurrection Bay. The doors have deteriorated significantly over 20 years, and many are structurally compromised. In some cases, indoor flooring has been damaged due to declining door integrity. We intend to replace all west-side doors with durable designs built to withstand environmental elements and traffic volumes. These new doors will provide greater efficiency in heating/cooling costs, movement of people and animals between labs, and will last nearly twice as long. Additionally, flooring and wall damage related to the deteriorated doors will be repaired in the adjacent indoor spaces.

Estimated cost: $219,000

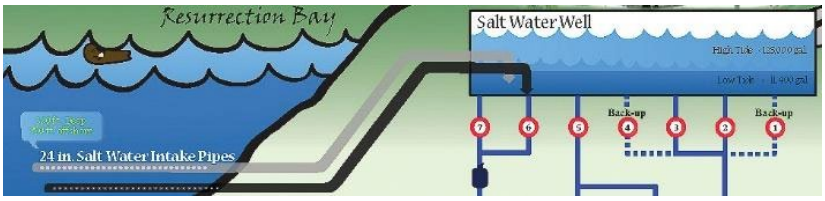
Research Space Expansion



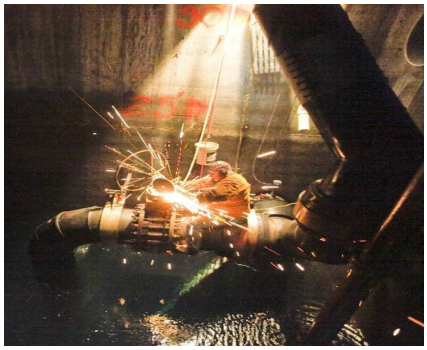
Approximately 4,700ft^2 of unfinished space is completely unutilized on the main floor of the Alaska SeaLife Center building. Due to lack of fire sprinklers, the space cannot even be used for storage. A portion of this space needs to be finished for additional research capacity. This space is adjacent to current mammal and fish curatorial areas, and expansion will allow for the growth of research projects, as well as space to store larger research equipment. We propose the addition of an exterior door, electrical outfitting, lights, and fire safety system to meet building code for storage.

Estimated cost: $235,000

Seawater Intake Line and Well Repair



Two 24-inch intake pipes supply seawater to the Center, which is essential for survival of all animals in the Center and the success of existing and future research projects. By 2004, after only six years of operation, staff estimated the lines were supplying only 50-60% of designed capacity due to biofouling. Engineering work recommended using a "pig" to scrub the inside of the lines as the pig is propelled through the entire length of the line under pressure. A grant from the State of Alaska in 2010 allowed the ASLC to do this for the east intake line, which resulted in regained water flow immediately. However, the underwater end of both intake lines remain problematic. That end of the lines is under 350 feet of water, and requires specialized equipment like remote operated vehicles (ROVs) to investigate and repair. The west line still needs to be re-configured to make pigging possible to ensure sufficient water flow for the facility. These main lines pump an average of 2,300 gallons of raw seawater per minute into our 125,000 gallon well, and a similar amount is received into the contaminated well at the end of the service line. Various debris, from silt and kelp to shellfish and mussels, collects in the bottoms of these wells, requiring periodic cleaning to ensure water quality and safety for research and animal welfare. The wells were constructed in a way that does not permit them to be easily cleaned and



serviced. We propose to hire Global Diving and Salvage to service and clean these wells, including visual inspection, siphoning, and repair. We propose to complete both lines to allow for frequent and reliable pigging to maintain clean intake without any residual biofouling, as well as necessary cleaning and repairs to ensure water quality for research and animal safety.

Estimated cost: $2,057,000

Seawater Pump Replacement

In addition to having sufficient seawater intake capacity, it is also critical to have sufficient pumping capacity to distribute that water throughout all labs and animal enclosures and pools. We are requesting support to replace our original seawater pump infrastructure with new pumps. The pump system, comprising four 40-HP 1,200 GPM, five 20-HP 600 GPM vertical turbine pumps and two 1,100 GPM trash pumps, is critical to our operations, and delivers water from Resurrection Bay to the animal habitats and heat pumps. Without this equipment the Center cannot function. The current system components are 20 years old and have been repaired and rebuilt many times. Now the pump assemblies, motors and related components are beyond reasonable repair and must be replaced. About 25% of this project has been recently completed, and the requested funds would bring the project to completion and ensure adequate pumping capacity for the next 20 years. This project will enable us to surpass compliance and efficiency standards, and will ensure the success of our research projects and the well-being of our animals.

Estimated cost $392,000 ($98,000 already received)

Fresh Water Pump House Barrier

The Center maintains a freshwater well and pump house to provide untreated water primarily for research purposes, but also for exhibit animals such as birds and salmon. Every few years, Seward experiences a flood event that causes gravel and water challenges at the Lowell Creek diversion tunnel waterfall, between the Center and the pump house. In the past, the pump house was nearly destroyed from floodwaters and accumulating gravel. The best way to mitigate the danger is to build a wall of concrete blocks to protect the pump house by deflecting gravel and water during flooding situations. The photo shows the location of the pump house relative to the waterfall and heavy equipment used in October 2018 during a moderate flooding event.

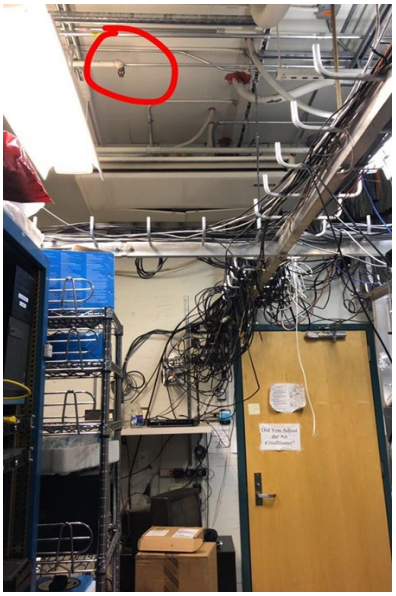
Estimated cost: $56,000

Animal Habitat Restoration

The rock work installed in animal habitats and concrete throughout the research areas during initial construction of the building has deteriorated after 20 years of weather, seawater, and traffic exposure. The current condition of the rock work and other areas poses a potential permitting and animal safety issue, which if not addressed, could force us to close habitats and research areas. Proper repair of this rock work and concrete will require hiring expert contractors for animal enclosure and related surfacing. Additionally, life support systems providing water, ozone treatment, and other operational needs to The Center are reaching the end of service life, or have surpassed it, and replacement of water pipe, valve, sensor, filter, and other components is necessary. To maximize efficiency, we propose to complete these critical life support repairs and replacements while the habitats are being repaired.

Estimated cost: $475,000

Server Room Fire Suppression

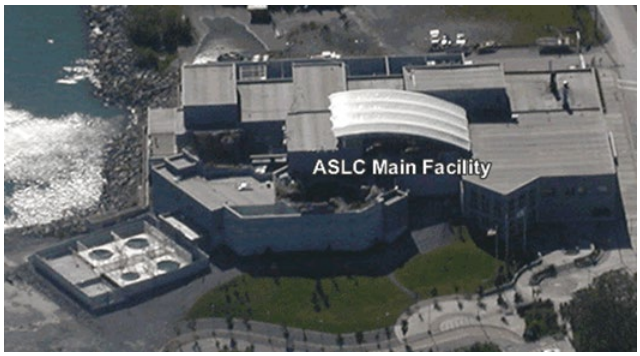


The computer server infrastructure at the Center is extensive and supports research data storage and analysis in addition to telephone systems, the accounting database, and other key technologies. The fire suppression system in the server room now is a water-based sprinkler system common to the entire building. If deployed, water from the sprinklers would damage or destroy every piece of electronic equipment in the room. Even though regular backups are performed, some data loss would occur. We propose installation of a clean agent fire suppression system which would suppress fire without damaging electronics.

Estimated cost: $43,000

Roof, Window and Door Restoration

The flat roof of the Center must withstand challenging snow, ice, rain and wind conditions at the edge of Resurrection Bay. The current roof has proven to be an inadequate roof since installation, and needs to be remediated. In addition, various windows and doors have not been able to withstand wind gusts and freeze-thaw cycles without permanent damage. The problematic roof, windows and doors are causing facility disruptions, unnecessary maintenance, and safety concerns. To remedy these problems, we propose restoring the roof by adding a durable, waterproof, fluid-applied silicone membrane over the existing EPDM membrane



(ethylene propylene diene monomer, a synthetic rubber). To achieve a 20-year system, the silicone membrane will be applied per the product data sheets, manufacturer's recommendations, and specifications. In addition, various windows and doors will be replaced with more appropriate models that will withstand the elements and reduce heat losses.

Estimated cost: $735,000

Building Automation System

The original building automation system (BAS) for all building operations (including lights, door security, environmental control, life support, fire protection) is outdated. Some automation is simply broken; for instance, some lights cannot be turned on or off through normal switches or motion-detectors and can only be controlled by overriding the sensors. The new BAS will maximize the impact of two decades of improvement to mechanical, lighting, and electrical systems that have complemented an energy conservation program, ongoing improvements to the building envelope, and a proactive energy procurement program. The new system will improve energy efficiency, reduce maintenance needs, and eliminate manual processes, therefore reducing staff time.

Estimated cost: $818,000

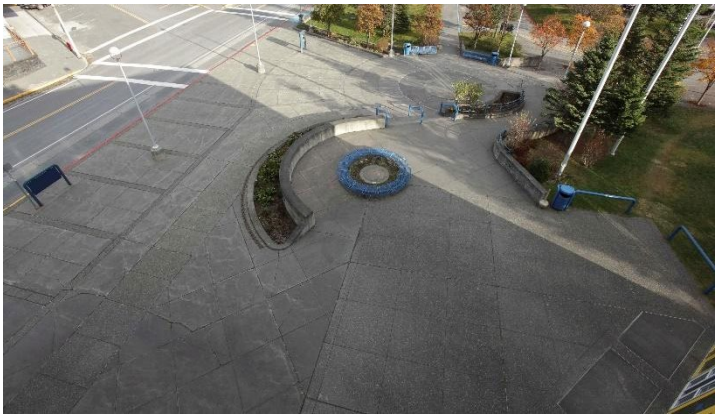
Heat Recovery System, Phase 2

The Center has been working for nearly ten years to reduce dependence on oil and reduce electricity use through energy-efficient heat pumps. The heat pumps use seawater for source heat and can benefit from the installation of heat recovery loops to reduce seawater pumping and to warm the source entering temperatures to improve the performance of the heat pumps. Unwanted or waste heat sources can be converted and used to improve the efficiency of the current heating system. The Tissue Storage and IT Server rooms generate large amounts of heat that require fire doors to be left open and the rooms to

be unsecured. Overheating of these rooms can destroy critical research samples, shorten equipment lifespans, and lead to equipment failure and the loss of vital research data. We propose to install fan coil units in each room to recover the heat by circulating glycol through the coils. Cooling the Tissue Storage and IT Server Rooms, thereby mitigating associated safety and security concerns, will ensure compliance with code regulations for research projects as well as IT infrastructure. This project also includes extensive service on the original heat pumps, as well as installation of a more robust safety alarm system.

Estimated cost: $419,000

Plaza & Sidewalk Repair/Replacement



The entrance to the Center for both staff and visitors is via a concrete plaza that connects the building to both the street and the parking lots. Over time, the underlying substrate has shifted, resulting in uneven settling of the concrete slabs, leading to breakage and safety hazards. To remediate these issues, the entire plaza and connecting sidewalks need to be replaced. This work will need to be completed during warmer weather and done in sections to maintain access to the building at all times. All concrete will need to be removed, the substrate repairs, radiant heat tubing replaced, and concrete re-poured.

Estimated cost: $316,000