IMS Infrastructure Improvements/
Alaska SeaLife Center

Design Program Workbook

August 2, 1994

Draft II

LIVINGSTON SLONE, INC.

Acknowledgments

Livingston Slone, Inc. would like to thank the many people who reviewed the first draft of the Design Program Workbook dated May 18, 1994. We look forward to continue working with you as we develop this workbook into the final Design Program for the IMS Infrastructure Improvements / Alaska Sealife Center.

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INTRODUCTION

Architectural Programming

Architectural programming is a research and decision making process which involves the client, design team, consultants and specialists, and most importantly, the users of the facility. The intent of the architectural programming process is to provide the designers of the building(s) with a clear definition of the scope of a project and the necessary criteria for a successful design solution.

Scientific and Education Work Groups

The programming process is an interactive process involving the users of a facility. As such it was important to organize representative user groups to help define the goals and needs for the IMS Infrastructure Improvements / Alaska SeaLife Center facility. The result included the formation of two user groups: the ***Scientific Work Group*** (SWG) and the ***Educational Work Group*** (EWG). Working with SAAMS and the design team, each work group has been instrumental in helping to define the detailed needs for this type of facility.

Both Work Groups participated in initial two-day workshops held in Seward, Alaska and a subsequent one-day workshop in Anchorage. These meetings brought together the owners, users and design team. This Design Program Workbook documents the information gathered from workgroup members as well as independent research done by the design team. Interaction with the Work Groups will continue throughout the design process and will be synthesized in future drafts of this Design Program.

Notes and Comments

How this Report is Organized

1.0 GOALS

Defining the GOALS for the project. The goals set the direction for the remainder of the architectural programming and design efforts. The goals have been organized into Organizational Goals, Research and Rehabilitation Goals, Education Goals, Building and Site Goals and Operational Goals.

2.0 FACTS

Gathering and Analyzing the FACTS. The amount and type of information we have gathered (and will continue to gather) will focus on the types of research and educational activities planned for the project and the functional and other special requirements needed for these activities.

3.0 CONCEPTS

Define and Test CONCEPTS. The concepts portion of the program document focuses on the abstract ideas intended as functional solutions to the project goals while using the facts that have been gathered. These concepts are intended as *ideas* without regard to a physical solution. The types of concepts which we are testing in this document include space relationships and organization, flow diagrams and site concepts.

4.0 NEEDS

Determine the NEEDS for the project. The Needs section of the program is where the Goals, Facts and Concepts are qualified and quantified. The project needs include square footage assignments for each of the activities outlined in the Facts portion of the design program.

Notes and Comments

GOALS

1.0 GOALS

1.1 Organizational Goals

Provide the required infrastructure for the Trustee Council to carry out appropriate research, rehabilitation and monitoring relating to the restoration of injured species and their habitat.

Create a "center" for the coordination and integration of the comprehensive research and monitoring of the ecosystem affected by the Exxon Valdez Oil Spill.

Provide a public education program which will expose visitors to research being conducted at the facility without creating public interference of research activities.

Provide the opportunity for visitors to understand, participate in and support research and rehabilitation activities relating to the marine environment of the EVOS Region.

1.2 Research and Rehabilitation Goals

Provide for the compilation, synthesis and dissemination of research and monitoring information of the EVOS Region.

Provide research and research facilities which focus on the health of marine species.

Provide and facilitate intertidal and subtidal habitat research and information for the EVOS region.

Provide and facilitate research of the biology and ecology of fish and invertebrates with emphasis on injured species and associate prey.

Provide and facilitate marine mammal research and monitoring with emphasis on the recovery of injured species.

Provide and facilitate marine bird research and monitoring with emphasis on the recovery of injured species.

Provide oceanographic services to the EVOS Region that are not currently available.

Notes and Comments

Goals

Attract new and innovative research on the marine ecosystem.

Provide for rehabilitation of injured marine species.

1.3 Education Goals

To feature the scientific investigations occurring at the facility, and to provide the opportunity for the visitor to interact with the researchers.

To provide experiences that will guide the visitor to knowledge of and stewardship for the EVOS marine environment:

- The visitor will clearly and memorably experience the history and key events of the area's marine region.
- The visitor will appreciate the significance of research in understanding the components of the marine ecosystem in the EVOS region.
- The visitor will be awe-inspired by the diversity, adaptations, and relationships of marine life forms in the EVOS region.
- The visitor will understand that there are current and future challenges for the area's marine region.
- The visitor can act appropriately to wisely use and to conserve the resources of the marine environment.

Notes and Comments

1.4 BUILDING AND SITE GOALS

The design of the facility must support a variety of changing research activities.

Provide a facility which complies with the Marine Mammal Protection Act, Department of Agriculture Animal Holding Regulations (Animal Welfare Act), and other applicable agency and permitting requirements.

Design the facility to meet the needs of the various user groups visiting and working in the facility.

Provide the researcher and visitor with up-to-date technology for communication and interpretation of research activities.

Design the facility such that the visitor can choose his or her level of participation based upon their individual level of interest.

Provide a positive physical experience in which the visitor feels a part of the marine environment.

1.5 OPERATIONAL GOALS

Provide a public visitor component which will assist in financially supporting the operations of the facility.

Provide a facility which achieves cost savings through energy efficient design and operations.

Promote recycling and environmental awareness amongst staff and the community.

Provide employment opportunities for local residents.

Notes and Comments

FACTS

2.0 FACTS

Notes and Comments

2.1 Research and Rehabilitation Component

2.1.0 INTRODUCTION

1. Project Description

2. Types of Research

Marine Mammals and Marine Birds

Population monitoring: distribution, abundance, movements, age structure, health status and disease studies, species interactions, behavior, human impacts, reproduction biology and physiology.

Medical research and rehabilitation: oil pollution effects, disease studies, parasitism, body condition, nutritional status, reproductive studies, mortality studies, diving physiology.

Ecological research: food web studies, energy requirements, growth studies

Fish and Invertebrate Research

Fish Genetics: Stock ID, chronic oil effects, inheritance studies, population genetics, bioenergetics, reproduction, neurobiology, and disease studies.

Intertidal and Subtidal Communities: population monitoring, chronic oil effects, bioenergetics, reproduction, neurobiology and disease effects.

Oceanography Research

Baseline Data: temperature, salinity, nutrients.

Monitoring: phyto plankton and zoo plankton, intertidal and subtidal community profiles.

Design Program

Ecological Modeling

Support the database and computer service needs of the Marine Mammal, Marine Bird, Fish / Invertebrate and Oceanographic Program.

Organize ecological information about species interactions.

Library Research

Provide a repository for EVOS damage assessment and restoration studies. Synthesize and disseminate information from research conducted at the facility.

Notes and Comments

3. Potential Participating Research Programs

Institute of Marine Science
(IMS) (Fairbanks, Seward)
- Physical Oceanography
- Chemical Oceanography
- Biology Oceanography
- Fisheries Oceanography
- ResearchVessels
- Marine Bird Ecology
- Invertebrate Biology/Ecology
- Marine Mammal Biology

IAB (UAF Fairbanks)
- Arctic Marine Mammal Studies

School of Fisheries and Ocean Science
SFOS (UAF Fairbanks, Seward, Juneau)
- Fisheries Biology

University of Alaska at Fairbanks
UAF Library System
- Data Programs

University Library Network

Alaska Center for Coastal Studies (Homer)

National Oceanic and Atmospheric Admin.
National Marine Fisheries Service
NMFS (Juneau, Seattle, Kodiak)
- Fisheries Biology
- Marine Mammal Biology
- Marine Mammal Stranding Network
- Research Vessels

Prince William Sound Science Center
- Data Programs
- SEA Programs

University of Alaska at Anchorage
- Medical Research Program

The National Biological Survey
- Division of Marine Mammals
- Division of Migratory Bird Mngmt.

Alaska Maritime Wildlife Refuge (Homer)
- Marine Bird Ecology

Alaska Department of Fish and Game
ADF&G (State Wide)
- Fisheries Biology and Genetics
- Marine Mammal Biology
- Research Vessels

2.1.1 Marine Mammals and Birds

Notes and Comments

MARINE MAMMALS

A. MARINE MAMMALS RESEARCH AND MONITORING ACTIVITIES

Research and Monitoring activities on Marine Mammals will include the following:

- Population and Reproductive Status
- Health Status and Disease Studies
- Food Habits
- Telemetry Studies
- Rehabilitation
- Field Studies
- Captive Feeding/Energetics
- Hydrodynamics
- Telemetry Equipment Testing and Development
- Testing of Immobilizing Drugs
- Physiology and Behavior
- Drug Studies

Marine Mammals considered for research inlcude:

- Harbor Seal: The EVOS caused population declines and sublethal injuries to harbor seals in prince William Sound. While some dead seals were recovered from the Kenai Peninsula, the extent of injury outside of Prince William Sound is unknown. Because harbor seal populations in northern Gulf of Alaska have declined precipitously since 1984, and the underlying causes of this decline are unknown, it is difficult to predict recovery from the oil spill. A better understanding of the causes of the decline will be required to determine the actions needed for recovery. (Source 20)

- Sea Otter: The EVOS caused declines in populations of sea otters in Prince William Sound and possibly the Gulf of Alaska. Sea otters were the most abundant marine animal in the path of the oil and were particularly vulnerable to its effects. While little or no evidence of recovery has been detected thus far, sea otters are expected to eventually recover to their prespill population, perhaps in several decades. However, future rates of population increase are difficult to estimate.

- Steller Sea Lions: Results from sea lion studies have been inconclusive concerning the effects of the EVOS. Steller sea lion populations have experienced a severe decline (up to 93%) over the last 30 years in the northern Gulf of Alaska. They are currently listed as Threatened under the Endangered Species act. No estimate of recovery time is available. As with harbor seals, a better understanding of the causes of the decline will be required to determine the actions needed for recovery.

Marine Mammals

B. MARINE MAMMAL WORK AREAS AND SPECIAL REQUIREMENTS

Notes and Comments

1. Marine Mammal Research Habitat

Habitat tanks are proposed for holding Marine Mammals in order to conduct long-term or short-term controlled live animal studies. It will, to the appropriate extent, duplicate the natural environment for proper husbandry and behavior studies. Types of studies include sensory systems, behavior, physiology, growth, nutrition, reproduction telemetry testing and other life history aspects.

Three individual habitats will house sea lions, seals and sea otters. Designation of habitat will be as follows:

Harbor Seals

Characteristics / Notes: These animals are readily available through rehabilitated but nonreleasable animals and surplus animals from other facilities. Six to twelve seals may be expected in this habitat for long term research projects.

The average adult male is 5.6 feet long and the average adult female is 4.9 feet long.

The seal research habitat pool should have the capability of being subdivided to separate seals as needed.

See 2.3.1 for "Special Design Requirements" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Steller Sea Lion

Characteristics / Notes: These animals are seldom turned in for rescue/rehabilitation and are less available than harbor seals.

Steller sea lions are large compared to other pinnipeds. Adult males may weigh up to 2,000 lbs and average 9.4 feet in length. An adult female averages 7.9 feet long.

Sea lions can climb vertical surfaces and jump to great heights. Sea lions are loud vocalizers, they are also aggressive and will bite humans and each other.

Only 2-4 Stellers are expected at any one time in the research habitat. (Source 5)

Marine Mammals

Funding is available due to their Threatened status, the cause of which is, for the most part, not understood. The types of research will include health, drugs, telemetry, and physiological studies.

Only two Steller sea lions have been made available from strandings in the past 15 years (Source 5). Sick or injured sealions have not been treated in the past because of the difficulty of capture and lack of adequate facilities.

Notes and Comments

Sea Otter

Characteristics / Notes: An average adult otter is 4.1 feet in length.

Many sea otters were injured by the Exxon Valdez Oil Spill and continue to be considered a recovering resource.

Sea otters are a common in the EVOS area and would be housed in the longterm research habitat.

Behavior characteristics make otters potentially destructive to artificial habitats and research tanks and pools. Sea otters will pick up rocks and loose objects and hit them against the sides of their habitat.

Sea otter feces float and must be skimmed from the surface.

Sea otters must constantly groom their fur to keep warm.

The capacity of the research habitat should accommodate 1-4 sea otters.

See 2.3.1 for "Special Design Requirements" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Transportation and Movement of Marine Mammals

Transportation and movement of Marine Mammals must be provided for.

There must be provided a method of moving cages for large mammals from one area to another such as fork lifts, hoists, etc.

Some animals, such as seals, can be moved by "walking them" from area to area; others are too dangerous and will require the use of cages.

There should be hoists and/or cranes, to lift and move animals out of deep tanks.

2. Marine Mammal Research Tanks / Pools / Pens

The Marine Mammal research tanks and pools will include a combination of tanks and pools located outdoors adjacent to the indoor research lab areas. These tanks and pools are used as a holding area for research projects, separation of animals for behavioral reasons, or specific scientific testing.

Research Tanks and Pools

These tanks and pools will be used for short term research or husbandry projects.

Research pools should be provided which are large enough for ***multiple animals*** such as a group of seals or several sea otters. Research tanks and pools are also used for pinniped and sea otter studies requiring observation of ***a single individual***.

Adequate ***haul out areas*** should be provided for both animals and for researchers to work on animals out of the water.

Provisions for ***video-monitoring*** of animals in tanks and pools should be provided.

There should be ***sheltered areas*** around tanks and pools so that staff can have some protection from weather while working.

Tanks must be built for ***easy cleaning; drains*** must be at the lowest point of the tanks and able to accept solids like fecal matter, bits of fish, etc.

Outdoor ***tanks and pool*** area should be located ***adjacent*** to indoor ***wet labs***.

Notes and Comments

See 2.3.1 for "Special Design Requirements" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

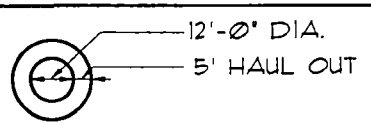
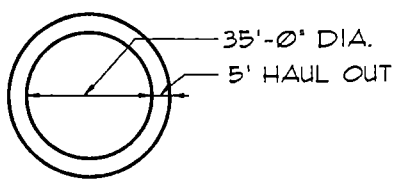
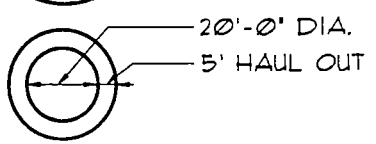
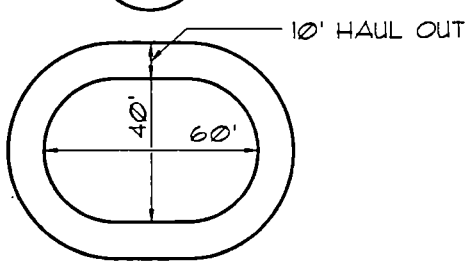
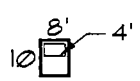
Marine Mammals

Research Pens

Research pens will be provided to accommodate short-term research projects. These rectangular pens will consist of both dry pens and pens with pools.

These pens will be used for short-term projects on individual animals, weaning of marine mammal pups and short-term holding of marine mammals before they are either placed in another part of the facility or released back into the wild.

The tanks, pools and pens proposed for Marine Mammal Research are as follows:

NO.	TYPE	DEPTH
TANKS / POOLS		
1		4 FT
1		20 FT
1		5 FT
1		10 FT (5 FT HALF DEPTH)
PENS		
4	8'X10' WITH POOL 	4 FT
4	8'X10' WITHOUT POOL 	

Notes and Comments

See 2.3.1 for "Special Design Requirements" of:

- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Marine Mammals

3. Research Work Areas -Wet Lab

A ***wet lab*** area should be provided for researchers to conduct marine mammal ***research activities*** such as sample taking, weighing of animals, etc.

This area must be designed to be capable of being a ***wet area.*** This area should be ***adjacent*** to the ***outdoor tanks and pools*** area.

4. Research - Dry Lab

A general purpose ***dry lab*** for marine mammal research should be provided to conduct biological and chemical studies, diagnostic and medical testing.

A ***computer area*** for data entry and analysis should be a part of this dry lab.

5. Rehabilitation, Veterinary Care and Husbandry

Vet and/Husbandry Work Areas

See 2.1.4 Veterinary and Husbandry Support page 27 for a description of individual spaces. These spaces include Marine Mammal quarantine and holding, food prep, vet clinic, i.e., surgery, etc.

Rehabilitation and Strandings

It is not the intention of this project to design a large rehabilitation facility but rather a research facility with rehabilitation capabilities. The rehabilitation to be carried out would contribute to our understanding of what is happening in the wild.

There is currently no formal stranding network in the State of Alaska. The National Oceanic and Atmospheric Administration (NOAA) maintains records of pinniped rehabilitations conducted in the State of Alaska (Source 5), NOAA historically reports about five stranded pinnipeds a year. It is anticipated, however, that with the construction of this facility more strandings will be reported.

Notes and Comments

See 2.3.1 for "Special Design Requirements" of:

- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Marine Mammals

Notes and Comments

Monitoring

Marine mammals are often monitored with transmitters. Additional knowledge is needed regarding the fate of individuals in the wild, including the nature of interactions with human activities such as commercial fisheries, before the effects of rehabilitation can be evaluated.

Several methods are available for such monitoring (i.e., VHF, video tape, and satellite linked tags), but they have not been adequately tested in Alaska.

Marine Mammals have to be released, if capable, after rehabilitation. Those animals unable to be released will be housed in the marine mammal habitat for long term research and public education.

Regulations

The Department of Agriculture currently regulates captive environments for marine mammals. New, stricter, guidelines are in the works through NMFS for rehabilitation of stranded animals and release of such animals at the appropriate time. The Marine Mammal Commission is reviewing the guidelines and their results will soon be released.

See 2.3.1 for "Special Design Requirements" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Existing Marine Mammal rehabilitation facilities in Alaska include the following.

Alpine Vet Clinic
Alaska Zoo in Anchorage
Marion Beck, an individual who works with harbor seals in Halibut Cove

Isolation of sick or diseased Marine Mammals:

The rehabilitation activities must be capable of physical separation from the research and habitat areas to prevent disease transmission.

Life support systems must be able to clinically isolate sick animals. Isolation will involve not only separate tanks, but control of water flow. Bringing in sick animals must be done so that there is no contact with resident animals. Water leaving "sick" tanks must be isolated and treated.

Marine Birds

A. MARINE BIRDS RESEARCH AND MONITORING ACTIVITIES

Research and Monitoring activities on Marine Birds would include the following:

- Population and Reproductive Status
- Avian Health and Disease
- Food Habits
- Live Animal Studies (physiology, pathology)
- Captive Feeding/Energetics
- Telemetry Equipment Development
- Behavior Studies
- Rehabilitation

It is anticipated that Research at the facility will be conducted on those Marine Birds considered to be "Injured Resources," this includes:

- Black Oystercatcher

- Murre: The oil spill caused population declines and sublethal injuries at murre colonies in the Gulf of Alaska. In general it is estimated that between 35% to 70% of the breeding adults at the Chiswell Islands, Barren Islands, Puale Bay, and Triplets were killed by the EVOS. The degree of recovery necessarily varies among the affected colonies. There are preliminary indications of recovery at the Barren Islands but it is not yet known when the timing of reproduction will return to normal. Agency scientist estimate it could take many decades and perhaps a century before the injured murre populations return to their prespill levels. Variables affecting recovery time include the amount of disturbance near colonies and the rate of migration from healthy colonies. (Source 20)

- Harlequin Duck: The EVOS caused population declines and appears to have caused sublethal injuries to harlequin ducks. An estimated 1,000 harlequin ducks were killed by the spill. Residual oil in the environment and in their preferred prey, is thought to affecting their reproduction and subsequent recovery. However, there is little known about how oil may affect reproduction and what physiological changes can be induced by feeding on oiled prey. Scientists disagree on the time it will take harlequin ducks to recover to their prespill levels, but estimates suggest that recovery may not occur for several decades. (Source 20)

- Marbled Murrelet: The EVOS caused an estimated 5-10% decline in the marbled murrelet population in the spill area. Marbled murrelets were thought to be declining Prince William Sound and the Gulf of Alaska prior to the oil spill. Although there is uncertainty associated with the decline, scientists expect it to continue. There are several factors that could account for this decline including a diminished food supply, increased population, reduced nesting habitat, or fishery interactions, but there are no conclusive data indicating if any or all of these factors are affecting the population.

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

- Pigeon Guillemot: The EVOS caused up to an estimated 15% decline in the population of pigeon guillemots in the Gulf of Alaska. Pigeon guillemots were thought to be declining in Prince William Sound prior to the spill. The reasons for the long-term decline are unknown which makes predictions about future population trends and the prospects for recovery extremely difficult. (Source 20)

Numerous othre birds were affected by the EVOS. There is a great deal of uncertainity about the recovery of populations of individual species because many were not studied. Research would be conducted on other potentially injured species in the EVOS area including:

- Ducks
- Gulls
- Terns
- Grebes
- Shearwaters
- Petrels
- Auklets
- Puffins
- Loons
- Cormorants
- Kittiwakes
- Geese

B. MARINE BIRD WORK AREAS AND SPECIAL REQUIREMENTS

1. Marine Bird Research Habitat

A Marine Bird Habitat is proposed for conducting long-term controlled live animal studies. It will, to the extent capable, duplicate features of the natural environment. Research studies to be conducted will focus on bird behavior, feeding and nutrition, physiology, growth, reproduction and other life history aspects.

Any ***combination of marine birds listed previously may be included in the bird habitat***. It is anticipated that the species of birds will vary depending on the nature of research being conducted at the facility. A preliminary estimate of the types and quantities of marine birds in the research habitat is as follows:

Black Oystercatchers - 2 pair	(4)	Puffins - 10 tufted, 2 horned	(12)
Common Murres - 12	(12)	Rhinoceros Auklets - 1 pair	(2)
Harlequin Duck - 2 pair	(4)	Black-legged Kittiwakes - 6	(6)
Marbled Murrelet - 2 pair	(4)	Kittlitz's Murrelet - 1 pair	(2)
Pigeon Guillemots - 6	(6)	Parakeet Auklets - 1 pair	(2)
	(30)		(24)
		Total	54

The research habitat will be sized to accommodate 50-125 birds depending on the species of bird and acceptable density of species.

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Marine Birds

The design of the Marine Bird Habitat will include, to the extent possible, features which simulate the natural environment. These include: cliffs, ledges, crevices, and burrows. Both rocks and sandy beaches will also be provided. Additional habitat information and behavior characteristics which may affect the design of the habitat include the following:

- Alcids require cliff spaces with access to burrows.
- Shorebirds need shallow (both wet and dry) spaces leading to water.
- Waterfowl require flat beach areas.
- Marbled Murrelets cannot mix with other Alcids.
- Large Alcids should not be mixed with small Alcids.

2. Marine Bird Research Tanks / Pools / Pens

The Marine Bird research area will include a combination of tanks and pools for individual or small group bird studies.

All tanks and pools must be fenced or ***semi-enclosed*** with netting to keep marine birds contained.

All tanks and pools should be ***portable*** in nature to allow flexibility in research projects. These will most likely be fiberglass, stand-alone tanks in a variety of sizes.

Tanks and pools should be equipped with floats or wooden docks; to ***provide dry area for birds***.

Tank areas should allow easy ***access*** to the researchers. The areas where researchers work may need to be elevated to provide access into tanks.

A combination of flexible ***indoor*** and ***outdoor spaces*** should be provided for these research tanks and pools.

Outdoor bird research tank and pool area should **be *adjacent to the indoor tank and pool area*** and indoor bird lab areas.

This outdoor area should be partially ***sheltered*** from snow and rain.

NO.	TYPE	DEPTH
MARINE BIRDS		
5	3' × 4'	20'

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Marine Birds

3. Wet Lab

A wet lab area should be provided for researchers to ***conduct indoor research activities*** on marine birds, such as sample taking, weighing of animals and daily handling of birds and other activities.

This area must be designed to be capable of being a ***wet area***. This area should be ***adjacent*** to the ***outdoor tank and pool area***.

4. Dry Lab

A ***general purpose dry lab*** for marine bird research should be provided to conduct biological and chemical studies, diagnostic and medical testing.

A ***computer area*** for data entry and analysis should be a part of this dry lab.

5. Veterinary Care / Husbandry Facilities

Vet Clinic / Husbandry Work Areas

See 2.1.4 Veterinary and Husbandry Support (page 27) for a description of Individual Spaces. These include Marine Bird wet and dry holding and treatment areas.

Rehabilitation

It is not the intention to conduct or provide extensive marine bird rehabilitation work. The facility will provide some rehabilitation treatment equipment and work areas. Existing Bird Treatment Centers include:

International Bird Rescue Program, Anchorage
Bird Treatment Centers in Anchorage, Valdez, and Homer

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Marine Birds

2.1.2 Fish / Invertebrates / Oceanography

A. RESEARCH AND MONITORING ACTIVITIES

Fish and Invertebrates

The facility would support research on the following injured EVOS resources:

- Pink Salmon
- Herring
- Intertidal/Subtitdal Habitat

Research and Monitoring activities on Fish / Invertebrates will include the following:

- Fish/Invertebrate health
- Food habits
- Population and Reproductive status
- Abundance estimations and resource management assistance
- Life history studies
- Physiology and Biochemistry
- Fish Genetics

Research and Monitoring activities on Intertidal/Subtidal Habitat would include the following:

- Intertidal/Subtidal community composition and biomass
- Intertidal/Subtidal community health

Oceanography Research and Monitoring

- Possible field research vessel / submersible activities include:
  Forage and fish research-behavior and feeding
  Crab research
  Effects of bottom trawlers on habitat
  Effects of oil on ocean floor habitats
  Studies of no-fishing zones and effects on habitats
  Studies of currents
  Long-term sampling and data collection
  Oceanography studies - Seward baseline

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Research Labs

B. FISH / INVERTEBRATES TANKS / POOLS

The Research area will include a combination of outdoor tanks and pools for holding fish and invertebrates for various research projects.

Outdoor Tanks

General Requirements

All tanks and pools should be ***portable*** to allow flexibility in research projects. These will most likely be fiberglass, stand-alone tanks in a variety of sizes. Sizes will vary and range from 4 feet diameter to 30 feet diameter pools.

Tank areas should allow easy ***access*** to the researchers.

Outdoor research tank and pool area should ***be adjacent to the indoor wet labs.***

This outdoor area should be partially ***sheltered*** from snow and rain.

A ***quarantine area*** for incoming fish must be provided *(see 2.1.4 Veterinary and Husbandry Support).*

Transportation and movement of tanks to provide flexibility must be considered. Fork lifts, hoists, etc. need to be incorporated into the design of the facility.

Lights will be needed for nighttime/winter work.

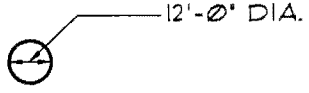
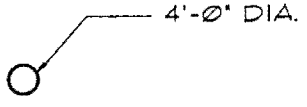
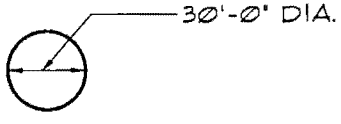
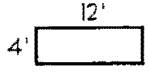
Outdoor Pools

Outdoor ***fish raceways*** are anticipated for a variety of fish research projects. In-ground concrete pools or above ground fiberglass pools may be used.

Estimated Quantity - 6 to 8

Notes and Comments

See 2.3.1 for
"Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

NO.	TYPE	DEPTH
FISH / INVERTEBRATES		
4		4 FT
20		4 FT
2		4 FT
RACEWAYS		
8		2'-6"

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:

- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Research Labs

C. FISH / INVERTEBRATES WORK AREAS - WET LABS

A ***series of wet labs*** should be provided to ***conduct research activities*** on a variety of fish and invertebrates and subtidal and intertidal organisms.

Wet labs must be designed to be capable of being continuously ***wet***. All finishes should be able to be washed down and disinfected while still being durable.

This area should be ***adjacent*** to the ***outdoor tank and pool area***. A large overhead door connecting the areas should be provided so that tanks and pools can be moved in and out as needed.

Water Supply/ Sources

Fresh Water: Options (200-300 gpm flow rate)

1. Dedicated spring or well water
2. Dechlorination of city water

Seawater:

Intake from Resurrection Bay

Provide for both filtered and unfiltered seawater

Fresh water and seawater may be ***mixed*** for some research experiments

Water Temperature Control - heating and cooling - should be provided. Water systems may need to be ***cooled*** to simulate more northern Alaska waters.

2 degrees to 3 degrees Celsius - Northern Alaska / Arctic water.

3 degrees to 7 degrees Celsius - Resurrection Bay.

D. DRY LABS / WORK AREAS

A ***series of dry labs*** should be provided for researchers to ***conduct research activities*** on a variety of fish and invertebrates and subtidal and intertidal organisms. Activities in these dry labs may include DNA analysis studies, microbiology, chemistry and pathology studies.

Wet Labs and ***Dry Labs*** will need to work together for most research projects.

Dry labs should be flexible with ***overhead utilities***.

Good ***ventilation*** must be provided.

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:

- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Research Labs

Storage

Storage for ***hazardous chemical and supplies for lab areas*** should be provided.

Storage for Oceanographic Equipment including:
Two automated oceanographic buoys to measure temperature, salinity and chlorophyll.

Temperature and Light Control Lab

Provided for physiology studies. This type of room can be a premanufactured unit, approximately 15' x 15'.

Requirements include controlled lighting, protected outlets, defrosting below 3°, floor drains.

E. RESEARCH VESSEL / SUBMERSIBLE REQUIREMENTS

A vessel committee is investigating acquiring a research vessel and submersible to be located at the existing IMS facility. The type of vessel being considered is a converted "mudboat" of 130-150 foot length. The type of submersible being considered is a two person "Delta" of approximately 16 foot length.

The facility needs logistical support ***for conducting field research*** in the EVOS area.

The project should integrate shore based laboratories with field-based research programs.

Oceanography sampling and studies are dependent upon a research vessel. ***Ecosystem research*** requires good base-line oceanographic studies which currently do not exist.

On-site support facilities would need to be provided to support ***the operations, storage and maintenance requirements*** of a research vessel.

The existing IMS research vessel (Alpha Helix) does not usually work in the EVOS Region . It is set up for oceanography, but not for fisheries research. The A/H is a National Science Foundation Vessel and gives priority to conducting NFS research.

Notes and Comments

See 2.3.1 for "Special Design Regulations" of:
- Life Support System
- Habitats
- Wet Labs
- Dry Labs

Research Labs

2.1.3 Data Collection and Monitoring Programs

A. MONITORING AND RESEARCH ACTIVITIES

EVOS Restoration Library
- Specialized Library and Database

Ecological Modeling Program
- Ecological Relationships
- Food Webs
- Synthesis, gap analysis, forecasting
- Mapping / GIS (Geographic Information Systems)

B. WORK AREAS

1. EVOS Restoration Library

Stacks
The Library must be provided with shelving and other storage devices for a variety of information mediums to be housed in the library. This would include the following:

Books	Microfilm	Research Papers
Microfiche	Maps	Newspapers
Video Tapes	Periodicals	Audio Tapes

Library Office
The library office will be occupied by a full-time librarian. The Library office should provide privacy as well a visual supervision of other library areas.

Processing / Work Area / Information Specialist
This area and occupying staff will process and organize all incoming research materials.

Computer Area
The computer area is for researchers to gather information on in-house information as well as off-site research data. The library at this facility would be part of Internet, Western Library Network (WLN), Polar Net and other electronic networks as appropriate.

Notes and Comments

Data Collection & Monitoring

Public Access
The library would be primarily a research library oriented towards the needs of the facility staff and other EVOS area researchers. Access to the visiting public would be provided for the distribution and sharing of research information.

2. Ecological Modeling Program

Faculty Office (1)
An office will be provided for this position which will be devoted to Ecological Modeling of the EVOS Area.

Student / Technician / Computer Area
A large common office for a student (1) and technician (1) would be provided, this area would be large enough for computers and layout space.

Notes and Comments

2.1.4 Veterinary and Husbandry Support

Veterinary and Husbandry Support Activities will include those areas necessary for general animal care activities. These areas will be shared by all researchers.

- Animal Quarantine Areas and Rehabilitation
- Animal Care and Treatment Clinic
- Food Services

A. ANIMAL QUARANTINE AND CRITICAL CARE

The animal quarantine area is needed to isolate all animals for either rehabilitation or research before being placed in other areas of the facility. These quarantine and rehabilitation areas are required for Marine Mammals, Marine Birds and Fish and Invertebrates. Additional quarantine will occur in the outdoor tank and pool areas.

Marine Mammal Quarantine / Critical Care Areas

These areas should be ***isolated*** to prevent cross contamination.

Food Prep - Mammals
A small ***food prep area*** should be provided which is separated from the central facility food prep area.

Equipment Storage
A ***dedicated equipment*** storage area should be provided to reduce cross contamination.

Treatment / Cleaning Area
An area should be provided to treat and clean marine mammals entering the facility as needed.

Holding / Critical Care - Indoor
A wet holding area is needed to ***quarantine*** marine mammals.

This area should be large enough to accommodate 4 - 8 marine mammals.

Notes and Comments

Veterinary / Husbandry

This area should consist of ***pens*** and ***pools*** which are ***compartmentized for disease control***.

Water supply will consist of ***seawater*** with ***separate supply and effluent lines*** to prevent cross contamination.

All surfaces must be capable of being disinfected/sterilized. The air system (supply and return) must be isolated to prevent cross contamination.

Variable lighting is required including natural light and full spectrum lighting with same photo period as natural light.

Visual and sound isolation between pools should be provided.

Controlled access must be provided to sterilize researchers entering and leaving Quarantine Area.

Marine Bird Quarantine / Holding Area Requirements

These areas should be ***isolated*** to prevent cross contamination.

Food Prep - Birds
A small food prep area should be provided which is separated from the central facility food prep area.

Equipment Storage
A ***dedicated equipment*** storage area should be provided to reduce cross contamination.

Treatment / Cleaning Area
An area should be provided to treat and clean birds entering the facility as needed. Sinks and work surfaces along the perimeter of the area should be provided.

Dry Holding
A dry holding area is needed to ***quarantine*** marine birds in a ***dry environment***, usually in bird cages.

This area should be large enough to accommodate 20 birds. Counters around the perimeter of this area should be provided to locate ***bird holding kennels***.

Electrical outlets and circuits will need to be provided for use of bird dryers.

Notes and Comments

Wet Holding

A wet holding area is needed to ***quarantine*** marine ***birds in water***.

This area should allow flexibility of ***portable*** pool / tank arrangements.

Recommended minimum ***tank size*** to be provided:
8 feet long x 6 feet wide x 4 feet deep
This size of tank will be large enough to accommodate ***25- 30 birds***.

Wet holding tank(s) must be provided with a ***dry area*** (25 square feet).

Wet holding tank(s) must be ***fenced or covered*** with netting.

Water supply will consist of ***seawater*** with extremely ***high quality of water*** to be achieved through skimming / water turnover / filtration.

Special Requirements

All animal holding and treatment areas should be considered ***wet*** areas and be provided with a concrete floor with floor drains.

All areas should have adequate HVAC to ***maintain temperatures*** ranging from 45-70 degrees Fahrenheit.

All ***air must be filtered*** to .3 micron particle size using HEPPA filters with 99.7% arrestance to filter out fungus spore and other contaminants.

All enclosed animal spaces should have at least ***12 air changes per day***. It would be best to have 24 changes per day, or 1 air change per hour.

All animal care areas must have cleanable ***surfaces*** which can be easily ***disinfected***.

Marine Bird rehabilitation areas must be isolated from research and public facilities to avoid contamination of captive birds by wild birds.

Notes and Comments

Veterinary / Husbandry

B. ANIMAL CARE AND TREATMENT CLINIC

Notes and Comments

An animal care and treatment clinic should be provided which will accommodate medical activities, procedures and associated equipment. These areas will be utilized by marine mammals and marine birds.

Surgical / Treatment Area

An animal treatment area should be provided which would allow the resident vet and researchers to examine animals, take x-rays and perform surgeries.

This area should be provided with a large ***overhead door*** for moving marine mammals into the area.

This area must be provided with a ***crane/hoist*** for lifting large mammals onto an examination table.

A ***storage area for drugs and medical supplies*** must be provided which is adjacent to the treatment / surgery area.

Necropsy Area

An area equipped for examination and necropsies of dead seabirds and marine mammals will need to be provided.

This area should be provided with a large ***overhead door*** for moving marine mammals into the area.

This area must be provided with a ***crane/hoist*** for lifting large mammals onto an examination table.

A ***storage area for necropsy supplies*** must be provided which is adjacent to the necropsy area.

Disposal for carcasses, contaminants and chemicals. Disposal options include incineration, landfill disposal, recycling, and hazardous materials disposal.

Skeleton Storage

Skeletons and bones are of great value and will be used for both display and research. They will help in the process of identification, archeological and health studies and studies on residual pollution in bones. Anchorage has an incinerator which can be used for disposing of unneeded

Veterinary / Husbandry

parts of dead animals; some skeletons may be salvaged.

Testing Laboratories

A large / flexible lab space will be provided for veterinary and husbandry ***testing*** of marine birds and mammals. This area may be shared with other research lab areas.

C. FOOD SERVICES

A food prep area should be provided to ***service the entire facility***.

This central food service area would act as a ***pantry to smaller food prep areas*** mentioned above for marine mammal and bird quarantine areas.

The food service area should be a ***wet area*** and should have a concrete floor with floor drains.

This area musts be capable of being sterilized with steam and disinfectant.

Food Storage

It has not been determined what percentage of food will be housed on-site and off-site. It is expected that local suppliers of animal food will be identified.

Six months is the maximum allowable storage time for fish.

Food Prep

Food prep consists primarily of thawing and chopping frozen fish.

Requirements include:
- Stainless steel sinks and counters
- Utensils and utensil storage
- Garbage disposal

Live Food

Live food storage / prep is desirable for marine birds. An aquarium tank to raise live food should be provided adjacent to bird habitat.

Notes and Comments

2.1.5 Research Component Staff and Support Areas

A. Staff Areas

Staff areas will need to be provided for researchers, which are separate from those staff areas provided for Educational Component and Facilities Support Administration.

Marine Mammal Administrative Spaces

Faculty Offices (2)

Offices will be provided for these positions which will be devoted to the study of marine mammals, combining studies of captive animals and field observation.

Visiting Scientist Offices (2)

Offices will be provided for visiting scientist participating in Marine Mammal research projects.

Student / Technician (1)

A larger common marine mammal office will be provided for students (3) and technicians (2) working at the facility. It is not anticipated that these staff would need individual offices since most of their daily activity will occur in the labs and other research areas.

Marine Bird Researchers Offices

Faculty Office (1)

Offices will be provided for this position which will be devoted to the study of marine birds, combining studies of captive animals and field observations.

Visiting Scientist Office (1)

An office will be provided for a visiting scientist participating in Marine Bird research projects.

Student / Technician Office (1)

A larger common office will be provided for students (2) and technicians (2) working on marine bird research at the facility. It is not anticipated that these staff would need individual offices since most of their daily activity will occur in the labs and other research work areas.

Notes and Comments

Fish / Invertebrate Research Offices

Faculty Offices (2)

Offices will be provided for these positions which will be devoted to the study of Fish and Invertebrates, including fish genetic damage, bioenergetics reproduction, neurobiology and disease.

Visiting Scientist Office (1)

A private office will be provided for a visiting scientist participating in Fish and Invertebrate research projects.

Fishery Biologist Office (3)

Three offices for Fisheries biologists (4) working at the facility will be provided. It is anticipated that most of their daily activity will occur in the wet and dry labs.

Technician Office (1)

One office for Fisheries technicians (6) working at the facility would be provided. It is anticipated that most of their daily activity will occur in the wet and dry labs.

Oceanography

Faculty Office (1)

An office will be provided for this position which will be devoted to Oceanographic Monitoring of the EVOS Region.

Visiting Scientist Office (1)

Technician Office (1)

Ecosystem Modeling Offices

See page 25 for Ecosystem Modeling office info.

Library

See page 24 for library office information.

Notes and Comments

Research Staff and Support

Chief Veterinarian's Office

This position will be devoted to medical research on disease, parasitism, rehabilitation, and nutritional requirements of marine mammals and birds. This position will be supported by one assistant and one to two graduate students.

Assistant Vet's Office

Graduate Students

Diving Equipment Storage / Lockers

Husbandry staff and researchers will be involved in diving activities. Lockers, showers and an area to hang diving suits is required. Storage for tanks and equipment must be accommodated. Facility should provide for a compressor for filling dive tanks.

Laundry

A laundry area, with washers and dryers, is needed for staff and scientists for soiled linen/towels used in the daily handeling of animals.

First Aid Station

Staff who are working with marine mammals will need to have ready access to a first aid station in the event of an animal bite or other injuries.

Showers and Lockers

Showers and lockers should be provided for staff working with animals. This should include an area to store wet clothes, nets, boots, etc., to dry.

B. TRASH REMOVAL

Trash Storage and Disposal

Hazardous Wastes Disposal

Disposing of hazardous materials in a proper manner must be provided. Items such as blood contaminated syringes, gloves, etc. may need to be autoclaved before they can be tossed in the trash.

C. STORAGE

Equipment Storage

Notes and Comments

Research Staff and Support

2.1.6 Research Equipment Requirements

7/18/94

		Draft Research Equipment List	Quantity	*Equipment Notes	**Shared Yes or No
Marine Mammals Research					
	Tanks and Pools				
		12' dia. x 4ft deep fiberglass tanks w/ haul out	4 each		No
		20' dia. x 5ft deep fiberglass tanks w/ haul out	2 each		No
		35' dia. x 10ft deep fiberglass tanks w/ haul out	1 each		No
		40' x 60' fiberglass tank w/ haul out -5' & 10' depths	1 each		No
		(4) 8'x10' pens with pools	4 each		No
		(4) 8'x10' pens without pools	4 each		No
		Cleaning Equipment			No
	Animal Handling				
		Hoist Dolly-1 per large tank	4 each		Yes
		Lg. Weight Scales-2 platform & 2 hang.	4 each		Yes
		Marine Mammal Transport Cages	6 each		No
		Nets	6 each		No
		Squeeze Cages	4 each		No
	Experimental Equipment				
		Acoustic Monitoring System - hydrophones, microphones	2 each		Yes
		Barometers	2 each		Yes
		Blood Gas Analyzers	1 each	Clinic	Yes
		Centrifuge-Hematrocrit	3 each		Yes w/all
		Clinical Chemistry Analyzers	1 each	Clinic	Yes
		Density Meter	1 each		Yes
		Electronic Temperature Readers	3 each		Yes
		Eye Wash Station	1 1/3 ea		No
		Fume Hood	1 each		No
		Gas Flow Meters	1 each		Yes
		Gas Mixing Device			
		Emergency Shower	1 1/3 ea		No
		Humidity Meters	2 each		Yes
		Metabolic Boxes	2 each		
		Metabolic Dome	2 each		
		Metabolic Hood	2 each		
		Oscilloscopes	2 each		Yes
		Oxygen & CO2 Analyzers	1 each		Yes
		Physiological Recorder	1 each		Yes
		Scintillation Counter	1 each		Yes

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	*Equipment Notes	Yes or No
Marine Mammals Research - con't					
	Experimental Equipment - con't				
		Sea Water Heat Exchangers			
		Soldering Station	1 each		
		Ultra Centrifuge (Gen. Lab. has 1 ea. / share w/all)	1 each	Beckman L7-65 Floor	Yes w/all
		Video Equipment-Underwater	2 each		Yes
		Water Baths - 3 @ 1500 & 2 @ 2500	5 each		Yes
		Watertight transporters - for above	12 each		Yes

Equipment

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	*Equipment Notes	Yes or No
Marine Birds Research					
	Tanks and Pools				
		Portable Fiberglass Pools	5 each	3'W x 4'L x 20"D	Yes
		(list)			
	Other Research Equipment				
		Marine Bird Transport Kennels	10 each	2 lg., 2 med., 6 sml.	Yes
		Bird Dryers/ Heat Source	6 each	Hairdryers	Yes
		Bird treatment table	2 each		
		Washing Tubs	10 each	3' Dia. x 18" Deep	
		Eye Wash Station	1 1/3 ea		No
		Emergency Shower	1 1/3 ea		No
		Fume Hood	1 1/3 ea		No

Equipment

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	***Equipment Notes**	Yes or No
Fish & Invertebrate Research					
	Tanks and Pools (purchased by project)				
	(ADF&G fish genetic program and other projects would bring their own tanks)				
		12' dia. fiberglass tanks	4 each		No
		4' dia. fiberglass tanks	20 each		No
		30' dia. fiberglass tanks	2 each		No
		20" dia. circular fiberglass tanks	12 each		No
		30" dia. circular fiberglass tanks (Genetics Lab. has 12 ea.)	12 each		No
		50" dia. circular fiberglass tanks (Genetics Lab has 4 ea.)	6 each		No
	Storage				
		Refrigerators - tissue storage	6 each		yes
		Freezers - tissue storage -			
		-80C chest type-lockable (Genetics Lab. has 3 ea.)	6 each	Forma Scientific #959	Yes
		-80C Upright type - lockable (Genetics Lab. has 2 ea.)	4 each	Forma Scientific #826	Yes
	Other Laboratory Equipment				
		Balances - Analytical	2 each		
		Balances - Electronic - (Genetics Lab. has 1 each)	2 each	Mettler #PB3002 Delta	Yes
		Balances - Top Loading	4 each		
		Calorimeter (micro, 0.005-0.01g)	1 each		yes
		Calorimeter (micro, 0.1-1.0g)	1 each		yes
		Centrifuge - Large Capacity - table top (Gen.Lab. has one)	1 each	Beckman GS-6R	yes w/all
		Centrifuge - table top	5 each	Clay Adams Sero-Fuge	
		Centrifuge, 500 ml. tubes - floor model	1 each		Yes w/all
		Centrifuge, Micro-Refrig'd	1 each		yes
		Chilling Unit - (Genetics Lab. has 1 each)	2 each		
		Compact Refrigerator - (Genetics Lab. has 1 each)	1 each		
		DNA Thermal Cycler - (Genetics Lab. has 1 each)	1 each	Perkin Elmer Cetus	
		Dry Bath - (Genetics Lab. has 2 each)	4 each		
		Drying Ovens	5 each		yes
		Eye Wash Station	3 1/3 ea		No
		Flow Cytometer - (Genetics Lab. has 1 each)	1 each	w/ 486 Comp.& Software	
		Flurometer	1 each		yes
		Freeze Dryer	1 each		yes

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Equipment

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	***Equipment Notes**	Yes or No
Fish & Invertebrate Research - con't.					
	Other Laboratory Equipment - con't.				
		Fume Hoods - one person - 4 ft. size	2 each		No
		Gel Incubator	1 each	Custom Built	
		Heath Incubators (Genetics Lab has 4 ea.)	10stacks	16 trays/stack	No
		Emergency Shower	3 1/3 ea		No
		Hydroacoustics System			
		Incubators (cold & warm)	4 each		yes
		Kjeldahl Nitrogen Analyzer	1 each		yes
		Microscope - Epifluorescent w/ access. - (Gen. Lab. has 1)	1 each		
		Microscopes (Compound & Dissection)			
		Mini Hybridization Oven - (Genetics Lab. has 1 each)	1 each		
		Orbit Shaker - (Genetics Lab. has 1 each)	2 each	Labline	
		Osmometer	1 each		yes
		pH Meter	3 each		yes
		Power Pack -1000V/500mamp - (Genetics Lab. has 2 each)	4 each	BioRad #1000/500	
		Power Pack-4000V/2000mamp-(Genetics Lab. has 1 each)	1 each	E-C #EC600	
		Powerpacks (Genetics Lab has 5 ea.)	10 each	Fisher Biotech #FB-135	Yes
		Spectrophotometer	1 each		yes
		Table Top Circulars (Genetics Lab has 4 tables)	4 tables	24 10 liter buckets/table	No
		Ultra Centrifuge (Genetics Lab. has 1 ea., share w/ all)	1 each	Beckman L7-65	yes
		Under Water Viewing System - (Genetics Lab. has 1 each)	1 each	Fisher Biotech	Yes
		Upwelling Bucket Incubators	4 tables	30 2.5 liter buckets/table	No
		UV Viewer - (Genetics Lab. has 1 each)	1 each	Fotodyne #3-3500	
		Water Distiller- 150 Liter per hour - share w/ all	2 each	Barnstead #MP-12A	yes

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	*Equipment Notes	Yes or No
Veterinary / Research					
	Surgery and Treatment				
		Cell Counter	1 each		Yes
		Centrifuge - Hematocrit	1 each		Yes
		Centrifuge - Tube	1 each		Yes
		EKG Monitor	1 each		Yes
		Endo ?? - Tubes		various sizes	
		Eye wash Station	1 each		No
		Gas Anesthetic Machine	1 each		Yes
		High Intensity Lighting System	2 each	double o.h. surgery type	Yes
		Emergency Shower	1 each		No
		Hydraulic Lift Table W/ Scale	2 each		Yes
		I.V. Pole	3 each		Yes
		Instrument stand	2 each		Yes
		Instrument tray stand	3 each		Yes
		Microscope - Binocular	1 each		
		Stainless Steel Cages	2 each	30 x 36	
		Stethoscopes			
		Surgical Equipment	2 each		Yes
		Surgical Exam Table	1 each	Hydraulic Type	
		Surgical Instruments	2 each		Yes
		Surgical Prep Tub	2 each		Yes
		Surgical Prep Tub w/ grate	1 each		
		X-Ray Machine (Non-Portable)	1 each		Yes
		X-Ray Machine (Portable)	1/2 each	shared w/ Necropsy	Yes
	Necropsy				
		Draining Examination Table	1 each		Yes
		Freezer - (-20 C)	1 each	300 cu.ft.	Yes
		Freezer - (-80C)	1 each	8' x 12' x 8'	Yes
		Surgical Equipment	2 each		Yes
		X-Ray Equipment (shared w/ surgery)	1/2 each	shared w/ surgery	Yes

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Equipment

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	*Equipment Notes	Yes or No
Centralized Research Dry Lab					
		Autoclave - Heat & Gas - Med. size for hand & surgical inst.	1 each	share w/ vet & Genetics	Yes
		Cell Counter	1 each		Yes
		Centrifuge - Hematocrit	1 each		Yes
		Centrifuge Room			
		Large Capacity-table top	1 each	Beckman GS-6R	Yes-w/all
		Ultra Centrifuge	1 each	share w/ all	Yes
		Centrifuges - Tube	5 each		Yes
		Eye Wash Station	1 each		No
		Fume Hood	1 each	1 person	No
		Emergency Shower	1 each		No
		Microscope-Binocular - w/ photographic capability	2 each		Yes
		Microscopes - Compound	2 each		
		Microscopes - w/ photographic capabilities	2 each	Dissecting Type	Yes

7/18/94

		Draft Research Equipment List			**Shared
			Quantity	***Equipment Notes**	**Yes or No**
Animal Husbandry					
		3/4" Garden Hoses	6 each	50' each	Yes
		Clothes Dryer	2 each		Yes
		Flash Water Heaters	2 each	port.,propane,30gal/min	Yes
		Washing machine	2 each		Yes
Food Services					
	Food Storage				
		Freezers	1 each	40,000 lbs. capacity	Yes
		Garbage Disposal	2 each		Yes
		Refrigerators	3 each	21 cu.ft. min.	Yes
	Food Prep		1 each		Yes
		Freezers		Walk-in type	
		* Note specific type of equipment or capacity, if necessary (i.e. 50 cu. ft. freezer storage).			
		** To be shared with other research groups			

2.2 EDUCATION COMPONENT

Education Component Description

The Education Component of the IMS Infrastructure Improvements / Alaska SeaLife Center will function in concert with and in support of the Research Component. The mission of the Education Component is to offer the message of environmental stewardship of Alaska's marine resources. Visitors to the Educational Component will observe interpretive displays of a cross section of Alaska's marine habitats. They will have the opportunity to meet members of the science and research staff and gain exposure to an array of scientific investigations. The facility will complement teaching programs in educational institutions across the state. There will exist the opportunity for educators statewide to bring students of all ages face-to-face with Alaska's rich marine life.

2.2.0 Education Component Audiences

A. INTRODUCTION

Defining the potential visitors to this facility is important to the successful planning of the Education Component activities. An understanding of the audience will help the design team make decisions with regard to media choices for interpretation of research, exhibit delivery methods and provision of spaces for educational programs.

Additionally, it is important to understand what will attract people to the facility and what will most interest people once they are in the facility. Attendance at this type of facility is most affected by word of mouth. The quality of the experience affects attendance. (Source 9)

Attendance in most science centers has been shown to correlate most closely with exhibit space. This is not a predictive model: every 10,000 square feet of exhibit space generates an average of 100,000 annual visitors. (Grinnell)

Notes and Comments

Education Audiences

B. CHARACTERISTICS OF ANTICIPATED PUBLIC VISITORS

1. Projected Attendance (Source 16)

250,551 - 264,000	first year
262,085 - 301,500	fifth year
222,772	peak period: June 1 - September 15 (85% of annual visitation)
14,570	average weekly visitors
2,914	peak day
875	peak attendance at one time

Comparable Visitation (1992)

Portage Glacier: 301,000
Kenai Peninsula: 183,000
Anchorage Museum of History and Art *: 184,400

* **Note:** Anchorage Museum of History and Art figures as reported in Anchorage Indicators show
1991 312,226*
1992 235,034
The 1991 figures include the robotic whale exhibit which The Imaginarium brought to Anchorage and displayed in Anchorage Museum of History and Art. This same total is included in the Fairbanks school visitor total to Anchorage for that same event.

2. Distribution of Visitors (Source 16)

Seward Residents	1.1%	2,800
Non-resident cruise	18.5%	46,400
Non-resident non-cruise	30.0%	75,600
South-central / Alaskan Residents	40.8%	102,220
Off-season (schools, others)	7-10%	23,531
	Total	250,551

Notes and Comments

Education Audiences

3. Characteristics of Alaskan Visitors (Sources 13, 14)

Average group size: 2.93 persons
Average household income: $35,632
Average age: 35

85% use private vehicles

4. Characteristics of Non-resident Visitors (Sources 13, 14)

Average group size: 2.2 persons
Average Household Income: $55,800
Average age: 47 years

85% are from the USA
50% have college degrees

5. School Visits

Projected School Attendance (Sources 13, 14)
Anchorage School District: 1000 students travel outside the jurisdiction each year
Fairbanks: 1500 students traveled to Anchorage (* This was due to the robotic whale exhibit sponsored by The Imaginarium in the Anchorage Museum of History and Art)
Kenai Peninsula: 200 to 250 travel outside jurisdiction; Seward is not outside this jurisdiction.

Note: These projected school attendance levels were felt to be ***low*** by Education Work Group Members.

Most science centers, as reported in Grinnell (Source 9), experience 24% of visitors from schools.

Transportation for students is a major concern. District policies limit ways students can travel. District funds limit available transportation.

Highest number of school visitors is from February through end of May.

Group school visits are scheduled ahead of time / reservations are made. Most districts require 30 - 60 day advance approval for overnight travel, thus making September/October scheduling awkward if not impossible.

Notes and Comments

Policies of Kenai Peninsula Borough School District for school class field trips: (Source 11)

Field trips lasting two or more days and involving overnight accommodation are the responsibility of the principal and staff subject to approval by the assistant superintendent 30 days prior to planned excursion. Chaperones are required. If travel is to be by boat or airplane, special certification and safety standards must be met.

Policies of Anchorage School District for school class field trips: (Source 10)

SECONDARY

Travel to Seward is classified as in-district travel for one day excursions. For overnight excursions, the policies governing out-of-district travel apply. Funding may be district supported or privately supported. For secondary student out-of-district travel there must be approval 30 days in advance, and chaperones at the rate of 1:10 are required.

ELEMENTARY

In the event a trip is around water, major roadways, overnight or outside municipal boundaries, it shall be considered hazardous and shall require completion of the criteria for overnight education trips. For elementary student out-of-district travel, the request for approval must be submitted two months in advance. The use of private vehicles for elementary student transportation outside the municipality is prohibited. Chaperones at the rate of 1:5 are required. A nurse must accompany the group. *Elementary students are not allowed to travel on water.*

Policies of Mat - Su School District for school class field trips:

Not known at this time

C. AUDIENCE GROUPS

There are many ways to classify and describe the types of visitors anticipated at this facility. The following information is presented to serve as a tool and a reminder of who our audiences are and what they need to have a positive and educational experience at this facility.

Notes and Comments

Education Audiences

1. General Admission Public

Most visitors come voluntarily during leisure hours.

Both learning science and having fun are important to most people coming to a science center. (Source 9)

Three Types of Visitors (Source 12)

Recreational Visitors: 40-50%
(come for fun, leisure time activity)
Interested Visitors: 40%
(leisure time activity with curiosity about the subject matter; will stop and read some of the interpretation)
Motivated Visitors: 10%
(Interest in the subject matter; will ask questions and will look at everything; will read everything)

Note: As an individual goes through the facility, he or she can change from one type of visitor to another type depending on the subject matter and presentation.

2. Special Admission Fee Visitors (Source 12)

80% On-site, self-guided (with or without docents at the exhibits)
20% Directed (tours, auditorium presentations, classroom activities)

Off - site groups participating in outreach programs.

3. Audience Assumptions

The following audience classifications were developed by Chris Parsons, Word Craft (Source 12). For each identified audience she has listed their characteristics, needs, and a suggested content and approach strategy for their experience at the facility.

Notes and Comments

First Audience: Visitors from tour/cruise boats (revenue generating)

Characteristics: High impact on the facility in short bursts; high interest in aesthetics, low interest in the content; possibly low interest in conservation issues.
Needs: High impact, high quality, impressive exhibits.
Content & Approach: Interpret / display the habitats and animals that they won't see or get close to on their cruise. Enrich their Alaska experience.

Second Audience: Summer visitors who drive or arrive by means other than cruise boats (revenue generating)

Characteristics: Low to high impact on the facility spread out over the day; interest in aesthetics, but also content; interest in conservation issues varies.
Needs: Variety of experiences through exhibitry mostly; some may participate in programs.
Content & Approach: Interpret / display the habitats and animals that they can't see easily on their own. Tell the story of the oil spill's impact from biological and cultural perspectives. Show / interpret the research and researchers working at the facility. For those participating in programs, allow for interactions with the scientist and technicians doing the work.

Third Audience: On-site school groups, most of whom will visit from March through May (revenue neutral or draining)

Characteristics: High impact on the facility in short bursts, usually mid-morning to early afternoon; interest in content, but also aesthetics; interest in conservation issues probably high.
Needs: Variety of experiences through exhibitry, programs and materials. Transportation and accommodations are major issues that must be addressed.
Content & Approach: Interpret / display the habitats and animals that are unfamiliar or the familiar in unusual ways. Tell the story of the oil spill's impact from biological and cultural perspectives. Show / interpret the research and researchers working at the facility. Allow for interactions with the scientists and technicians doing the work.

Fourth Audience: Off-site school groups, possible year-round (revenue neutral or draining)

Characteristics: Low impact on the facility; interest in content, but also aesthetics, interest in conservation issues probably high.
Needs: Variety of experiences through programs and materials.
Content and Approach: Interpret habitats and animals that are unfamiliar or the familiar in unusual ways. Tell the story of the oil spill's impact from biological and cultural perspectives. Show / interpret the research and researchers working at the facility. Allow for interactions with the scientists and technicians doing the work.

Notes and Comments

Fifth Audience: Educators, on-site or off-site (revenue neutral or draining)

Characteristics; Impact on site varies, depending on the time of year and whether the programs are held on-site or off-site; interest in content and continuing education; interest in conservation issues could be high.
Needs: Variety of experiences through exhibitry (if on-site), programs and materials. Accommodations may need to be addressed.
Content and Approach: Interpret habitats and animals that are unfamiliar or the familiar in unusual ways. Tell the story of the oil spill's impact from biological and cultural perspectives. Show / interpret the research and researchers working at the facility. Allow for interactions with the scientists and technicians doing the work. Show how content is applicable to classroom situations and curriculum.

Sixth Audience: Off-season visitors & members, could be on-site or off-site (revenue generating)

Characteristics: Low impact on the facility; interest in content, but also aesthetics; interest in conservation issues possibly high.
Needs: Variety of experiences through exhibitry, programs and materials.
Content and Approach: Interpret habitats and animals that are unfamiliar or the familiar in unusual ways. Tell the story of the oil spill's impact from biological and cultural perspectives. Show / interpret the research and researchers working at the facility. Allow for interactions with the scientists and technicians doing the work.

D. PUBLIC VISITATION DESIGN CRITERIA

Orientation

Orientation is important to the visitor. Orientation to content as well as to the building contributes to a satisfying visit.

Orientation needs to happen throughout the facility as well as when he/she enters the building.

Orientation needs to not compete with satisfying the "First fish" syndrome.

Visitors need to understand how to get into and around the facility without getting lost.

Visitors need to understand content options so that they can exercise choice in structuring their visit.

Notes and Comments

Education Audiences

Motivation to visit the facility

What will attract people to the facility?

- Word of mouth
- Marketing
- Quality
- Attractions

What attractions will pull people to the facility?

- Closeness to marine mammals and birds
- Viewing live animals
- Touching live animals
- Reputation for "Cutting Edge" technology and research
- Images / scenery that one cannot see in the usual walking or driving experience
- Changing nature of facility - not the same old thing year after year
- Gallery for traveling exhibits, displays
- Constantly updating the interpretation of the research
- Top-notch bookstore

Facility Reputation

What attractions will bring people back to the facility in addition to the above?

- Crowd management
- Rewarding experiences as a self-directed, self-guided visitor
- Adequate and convenient parking
- Well-trained staff
- An experience to share with visitor's social group

Notes and Comments

Education Audiences

2.2.1 Education Component Activities

Notes and Comments

INTRODUCTION

The Public Education Component of the IMS Infrastructure Improvements / Alaska SeaLife Center project will engage the visitor in the research activities at the institution.

The animal ***research activities*** involving indigenous seabird, pinniped, sea otter, fish and invertebrate species will be the ***education exhibit focus***.

The emphasis of the interpretation will be placed ***upon communicating current activities and events*** within the institution and region that are contributing to the general knowledge of the EVOS area and beyond. The current events emphasis will be integral to the continuing success and public interest at the institution. The nature of these activities will constantly create new information and activities that will need to be communicated to the general public and educational groups.

The ***anticipated activities*** of the Educational Component can be divided into two activity groups. Each of these will continue to be developed throughout the schematic design process. An overview of these two classifications is as follows:

1. Education Through Interpretation

Provide interaction between the research component and the public.
Present and interpret the research occurring at the facility to the public.
Provide various levels of penetration of public into research areas.

2. Education Through Programs

Programs for fee-paying public
School classes on-site
School classes off-site

Education Activities

A. EDUCATION THROUGH INTERPRETATION

1. Interpretation of Research

It is a goal of this facility to provide ***various levels of penetration*** of public visitors into the research and rehabilitation component.

The visitor will be ***exposed to the interaction of research and animal care activities*** for marine mammals and marine birds and the general ecology of the region through the use of:

- Natural Research Habitat viewing and interpretation
- Videos, graphics and printed materials
- Interpretation with trained docents
- Interpretation with researchers in laboratory conditions

Some of the ***questions*** which may be developed as ***part of the interpretation*** include the following:

- Who is the Researcher?
- What are the questions researchers are asking?
- How are they trying to answer these questions?
- What are the tools and processes they are using?
- How can the visitor / student participate in the research?
- What is the impact on the visitor / student?
- What difference can the visitor make?

Questions which may be developed regarding the ***research subjects:***

- Which species are being researched?
- What is their behavior?
- What do they eat, etc.?

Notes and Comments

Note: In a June 6, 1994, meeting of the Education Work Group (EWG), the Group discussed the "Big Idea" (Source 19) the "Big Idea" is the fundamental meaning (the soul of the exhibit) that is important to human nature. It delineates what will and what will not be in the exhibit and guides the interpretation. The questions that accompany the "Big Idea" are prioritized, and further define it. In this preliminary form, the group agreed on the following "Big Idea" and questions.:

The oil spill makes us aware that we did not know what we had and what we could lose.

1. What are the components of the marine ecosystem affected by the oil spill?
2. How do they work together to make an ecosystem?
3. Why is this ecosystem important?
4. What can we do so that we don't lose it?

Education Activities

Methods to ***present the actual people doing the research*** need to be carefully crafted. It is important that research work not be hindered while providing optimum public access.

- Focus on a "Researcher of the Day." This is the person doing the research but she/he is separated from the public by a glass window. The researcher speaks to the group beyond the window aided by a microphone and the interpretive assistance of a docent accompanying the group. Feature the researcher in videotapes and photographs shown throughout the building. Include the full spectrum of individuals who keep a facility such as this in the forefront of the research field. Include the technicians as well as individuals involved in caring for the facility.

- Introduce other people in the facility to the public
  Who takes care of the animals?
  Who takes care of the building?

Provide an ***interdisciplinary approach*** to interpretation of research. The focus should be on marine biology, but not to the exclusion of the enriching experiences of other sciences and the humanities.

Layers of interpretation should be provided which ***correspond*** to the types of ***audiences***, i.e., recreational, interested and motivated.

Layers of interpretation should be provided which respond to all ***age groups*** and ***education levels***.

2. Exhibits

Exhibits will be provided which illustrate and support the interpretation of the research activities. These exhibits would also help to create the link between the research being done and the big picture of the ecosystem. Ideas for exhibits were suggested by the education work group at the programming workshop held in Seward.

Research Habitats - Marine Mammals and Marine Birds

The animal ***research habitats and activities*** involving indigenous seabird, pinniped, sea otter, fish and invertebrate species will be the ***education exhibit focus***.

How do marine mammals and birds behave underwater? What do they look like? Why do they look the way they do? How do they relate to one another? What are their needs? What do they eat? How do humans impact them? Care for them? What kind of research is being done at the facility on them? Who is Steller and why was the Steller Sea Lion named after him?

Notes and Comments

Marine Resources: Fish

How do people use marine resources: past, present, future?
Fish: Why and how do we manage them?
How do fishers catch fish? What types of equipment, vessels, materials do they use?

Resurrection Bay

What is the Geology of Resurrection Bay? What does the Bay look like under the water? What is the sea bed topography? What does real-time video from a submersible show us? How deep is the Bay? Why does water in the Bay move the way it does? How are waves generated? What are water currents? How does the Coriolis effect relate to Resurrection Bay? What is pressure under the sea?

Exxon Valdez Oil Spill

What was the Exxon Valdez Oil Spill? What was the region like before the oil spill? After the oil spill? Now? What species of birds and mammals were affected by the spill?

Data Collection and Ecological Modeling

How are the changes in the region monitored? What kind of data is collected? How does the research at the facility affect the ecosystem? What is ecological monitoring?

Invertebrates

What are the marine invertebrates of this area? Why do they live where they do? What are their survival strategies? What is their relationship to the marine mammals and birds? How do humans impact them?

Intertidal and Subtidal areas

Where are intertidal areas located in the EVOS area? What kind of organisms live in these areas? What were the effects of the earthquake on intertidal zones?

Notes and Comments

Education Activities

3. Delivery Methods for Interpretation of Research

- First Fish Syndrome! Need to satisfy visitor curiosity and need to immediately observe a live animal
- Text
- Graphics
- Murals, art
- Audio tours - self guided
- Docents
- Interviews with scientists - real time or prerecorded
- Provide tours of research areas with staff who understand research and can explain it to the public.
- Computers
- Curatorial displays
- "Fun" manipulatives
- Hands-on, tactile displays
- Objects that allow personalized connection throughout the exhibits
  magnetic cards
  bar-coded cards
- Underwater viewing
- Video

Notes and Comments

B. EDUCATION THROUGH PROGRAMS

Educational Programs should be interdisciplinary. The educational department of this institute should cross over from the sciences to the humanities.

1. On-Site Educational Programs

School Class Visits

Special classroom activities
Simulated lab work
Teacher / docent led exploration
Visit research areas

Facility Guided Tours

Tours of the public facility areas
Tours of the research areas

Auditorium presentations

Movies
Lectures
Imported experts, speakers
Researcher presentations

Workshops

General subject
Special topic
Short -term one day
More than one day: i.e. week-long, science camps

Sleepovers

Adjunct to class visits for distant schools
"Camp-in"

Notes and Comments

Education Activities

Teacher enhancement

Learning must be provided for both teachers and the students.
Provide training for teachers similar to training for docents. Teachers are thus prepared prior to their visit with their students.
General teacher training for off-site interaction with the Institute.
Teaching teachers has a significant multiplier effect.
Teacher needs may be different than student needs.

Publications

Curriculum

Staff, Volunteer and Docent Training

Prepare docents to be guides for education opportunities
Include training for researchers in public presentation strategies

Student interns

Work-study for college and graduate students for university credit
Secondary students as "explainers" for summer visitors

Membership events

Education–research teaming

Pay to be a researcher

Model after programs where individuals pay to work in archaeological digs

2. Off Site Educational Programs

Traveling vans

Electronic links

Teachers/lectures, visit classes

Videos

Sea lore - Storytelling

Knot tying

Notes and Comments

2.2.2 Education Component Work Areas, Staff and Design Requirements

Notes and Comments

A. EDUCATION COMPONENT ACTIVITY AREAS

Training Areas for docents, staff and teachers

Resource Center with computer and video tapes where teachers can gather information and take back with them to schools.

Reference Library

Bookstore / Gift shop - Relationship to the Mission of the Facility

Should be a well stocked bookstore - marine environment and species
Provide new items / report for educators
Children's materials - take homes
Older hard to find editions (Steller's Journals)
Interdisciplinary approach to materials (i.e. Moby Dick)
Items should be representative of this place
Cover the range of prices with quality items

Classrooms

More than one class should be able to be accommodated at the same time
Classrooms should be equipped with lab counters and equipment
Sinks and wet areas for younger as well as older users
Storage for supplies, curatorial specimens
Needs to accommodate 60 students (one bus load)
Classroom would be multipurpose and could be used for docent training, researcher demonstrations, etc.

Exhibit Development / Interpretation

An area for preparing interpretive materials and repairing exhibits
Layout space
Computer work area
Some graphic capabilities to be provided in-house. Multiple mediums to be used: some may be done in-house; others will be sent out.
Storage for education props

Education Work Areas

Program Development Office
Development and coordination of internal and outreach programs

Volunteer Coordination
Coordination of Volunteers / Docents

Auditorium
Area for large groups to view films, etc. on research projects.
Auditorium would accommodate 200 people.
Auditorium would be used for docent training.
(See Lobby and Public Spaces)

Informal Assembly Area(s)
Exhibits and Circulation Areas for public viewing and self guided tours
Facility should include several areas along the public path where a tour guide could gather and talk to 15 people at one time. This would be the same for the "behind the scenes" tours where visitors are taken in small groups into the research areas.

Storytelling
Informal classroom
Docent programs
Brown bag break area for visiting class groups
Brown bag break area for staff, docents, volunteers

Information Area(s) / Lobby
Orientation / Information
Activities throughout the greater Seward area
Ticketing
Program offerings
Daily features
Thank you to donors, contributors, volunteers

Public Support
Coat Room
First Aid Room
Restrooms
Storage
Wheelchair / Carriage Storage

Notes and Comments

Education Work Areas

Places ***to rest*** in exhibit areas or in addition to exhibit areas

Outdoor ***areas*** with tables, benches

Storage along public circulation areas for education props, materials, etc.

Outreach Van
Parking, storage for props
Access to loading live animals, etc.

B. EDUCATION COMPONENT STAFF

Education Director / Developer

Communicator / Writer to translate technical data for public consumption
Naturalist / Interpretive Staff (2)

Liaison with School Districts

Reservationist - Coordination of on-site and off-site resources

Volunteer Coordinator

Short term visiting experts who could be writers, marine scientist, educators

Graduate students

Volunteers and Docents
Interpret exhibits in informal presentations
Serve the public by answering questions
Connect the public to the researchers

Notes and Comments

Education Work Areas

C. EXHIBITRY DESIGN CRITERIA

Flexibility for changing and traveling exhibits
- Lighting / electrical flexibility
- Floor loading capability for movable small tanks
- Delivery methods flexibility

Flexibility in education component work areas for multipurpose uses

Maintenance ease for standard cleaning purposes

Notes and Comments

Education Work Areas

2.3 FACILITY / SUPPORT

2.3.0 Facility Support Activities and Work Areas

A. ADMINISTRATIVE

The Administration of the Facility will work for both the Research and Educational components of the Facility.

Administrative Areas

Executive Director
Executive Secretary
Finance Director
Administrative Assistant
Marketing Director
Membership Coordinator
Accounting Assistant
Program Director
Administrative Assistant
Research Director
Administrative Assistant

Administrative Support Areas

Conference Room
Files/Record Storage
Office Supplies
Marketing Supplies

Staff Areas

Staff Break Room
Staff Restrooms
Staff Showers and Lockers

Public Support

Coat Room
First Aid Room
Rest Rooms
Storage
Wheelchair / Carriage Storage

Notes and Comments

Facility Support

B. BUILDING SECURITY, OPERATIONS AND MAINTENANCE

Notes and Comments

Security

The security system for the facility will consist of a 24 hour electronic security system. Security for both the Facility and the animals must be provided.
Systems / Control
Office

Custodial

Storage
Office

Workshop

A workshop will be provided. It will be used by Researchers to construct Animal cages, platforms, and other devices needed for research. The Education Development staff will use the workshop for constructing exhibits, and educational props in-house.

Maintenance

Chief Engineer's Office
Central Control Room - This room will monitor all mechanical and life support systems in the Facility.
Electrical Room
Mechanical Room

Storage

Building Storage
Grounds Storage

C. BUILDING SERVICES

Loading Dock
Receiving Office
Holding
Trash Storage and Removal
Hazardous Wastes Disposal

Means for disposing of hazardous materials in a proper manner must be provided. Items such as blood contaminated syringes, gloves, etc. may need to be autoclaved before they can be tossed in the trash.

2.3.1 Special Design Requirements

Notes and Comments

A. LIFE SUPPORT SYSTEMS

Introduction

The seawater supply system for the IMS / ASLC Infrastructure Improvements comprises duplicate intake pipelines and intake structures; a seawater intake wet well located within the building facility; a centrally located seawater supply pump room above the wet well; and various seawater supply distribution systems consisting of pumps, piping, valves, fittings, filters where required, flow meters, operating controls, etc. Each distribution system draws seawater from the wet well and supplies it to the respective research, rehabilitation and marine habitat facilities within the complex.

The following separate seawater supply distribution systems are included:

- Marine Mammal and Bird Habitats
- Marine Quarantine and Critical Care Facilities
- Research Tanks
- Wetlands
- Classroom

Each system will include at least two pumps (one to be redundant for emergency standby purposes) and a single pipe distribution system feeding the respective tanks and/or pools. A separate recirculation line will return a portion of the total system supply flow to the wet well; this will ensure that the seawater in the piping distribution system will be kept fresh and not allowed to remain fallow. Filters will be required on some of the systems. High rate pressure sand and gravel filters are considered the most appropriate selection at this time.

The following statements describe the concept for the seawater intake and supply system and for the associated seawater collection and disposal systems.

Seawater Intake System

The intake structures will be perforated pipes supported on concrete anchor blocks to keep the intakes off of the sea bottom at a depth of approximately 250 feet. The number of perforations will be calculated and determined on the basis of the established final design flow and on the criterion to keep the intake velocity less than 0.1 feet per second.

Each intake structure and pipeline will be designed for the full flow requirements of the center. At this time the flow is estimated to be between 4,500 and 5,000 gallons per minute. The second intake line is for redundancy and will allow one line to be maintained while the other is in service. The concept of two intakes provides the degree of reliability required for life support systems supplying ongoing research work which can extend for years in duration.

The wet well is common to all of the seawater supply and distribution systems. It serves as a recirculation and monitoring chamber as well as an untreated (raw) seawater holding well. Because it is readily accessible it provides onshore storage and settling of untreated seawater. If both intake pipelines were to fail due to a seismic event, or some other event, temporary construction pumps could be used to transfer seawater directly from a beach intake to the wet well. This wet well concept therefore increases the reliability of the overall seawater intake and supply system.

As described above, each seawater supply distribution system then draws water from this wet well and distributes it to the respective facilities.

Seawater Collection and Disposal Systems

Each seawater supply system will be augmented by seawater collection and disposal systems, depending upon the specific use of the seawater in the respective systems.

Generally, the concept of disposing of used seawater is to discharge it into an outfall pipe which terminates below extreme low water at a depth of approximately 50 feet below low water.

Several categories of used seawater have been identified as follows:

CLEAN WASTE WATER

Once through systems for research and rehabilitation facilities where untreated (raw) or filtered seawater is supplied to a research or holding tank or pool; this waste water will be discharged directly to the disposal system outfall without treatment. Some of this seawater may also be directed or discharged through the tidal pool which is proposed for future construction as part of the wave barrier.

CONTAMINATED WASTE WATER

Once through systems as for clean waste for research and rehabilitation facilities but where the waste water emanating from the holding and research tanks may be contaminated; this waste water will be separately collected and discharged to a treatment facility which will disinfect, dechlorinate, or otherwise treat the waste water prior to discharge to the main outfall.

CHLORINATED WASTE WATER

Overflow waste water from any marine mammal and/or sea bird habitat containing a chlorine residual will be separately collected and discharged to a treatment facility prior to discharge to the main outfall.

Notes and Comments

FILTER BACKWASH WATER

All filter backwash water will be separately collected and will be discharged to the central treatment facility, as for other contaminated wastes.

The following statements outline the anticipated quantities of waste or spent seawater and the type of collection and disposal system (including waste treatment) required:

Marine Mammals and Sea Birds

Each marine mammal and sea bird habitat will employ a self-contained recirculating life support system using high rate sand and gravel filters; biological filters where fish are held; and disinfection facilities (ozone, chlorination or a combination of both).

The seawater make-up supply system to all of the habitats will have a capacity of 600 gallons per minute. Because these habitats include underwater viewing the seawater make-up flow will be filtered using high rate sand and gravel filters.

Some of the overflow water from the habitats may be chlorinated (not greater than 0.5 ppm residual) such as the seal and sea lion habitats. It is proposed that the chlorinated overflows will be treated (with ozone) along with other wastes from the complex.

Overflow water which is not chlorinated or otherwise contaminated will be discharged to an outfall sump, along with other waste discharges, and then to the outfall pipe.

Marine Rehabilitation and Critical Care Facilities

The seawater supply system to all holding tanks and pools will have a capacity of 1,000 gallons per minute. The seawater supply will be unfiltered water.

The used or spent seawater from some of these tanks or pools, if considered contaminated by disease pathogens or chemicals will flow to the waste treatment facility prior to discharging to the outfall sump and outfall.

Uncontaminated seawater emanating from these rehabilitation tanks and pools will discharge either through the proposed tidal pool or directly to the outfall.

Notes and Comments

Research Tanks

The seawater supply system to all research tanks will have a capacity of 2,600 gallons per minute. This supply will be unfiltered water.

As for the rehabilitation system, the used or spent seawater emanating from the tanks or holding pools will be either treated, if contaminated and then discharged to the outfall; or discharged to the proposed tidal pool or to the outfall directly, if uncontaminated.

Wet Lab Areas

The seawater supply system to all wet lab areas will have a capacity of 200 gallons per minute. This supply will include filtered and unfiltered water.

It is anticipated that waste water emanating from these areas may be contaminated and that all will separately collected and discharged through the waste seawater treatment facility, prior to discharging into the outfall.

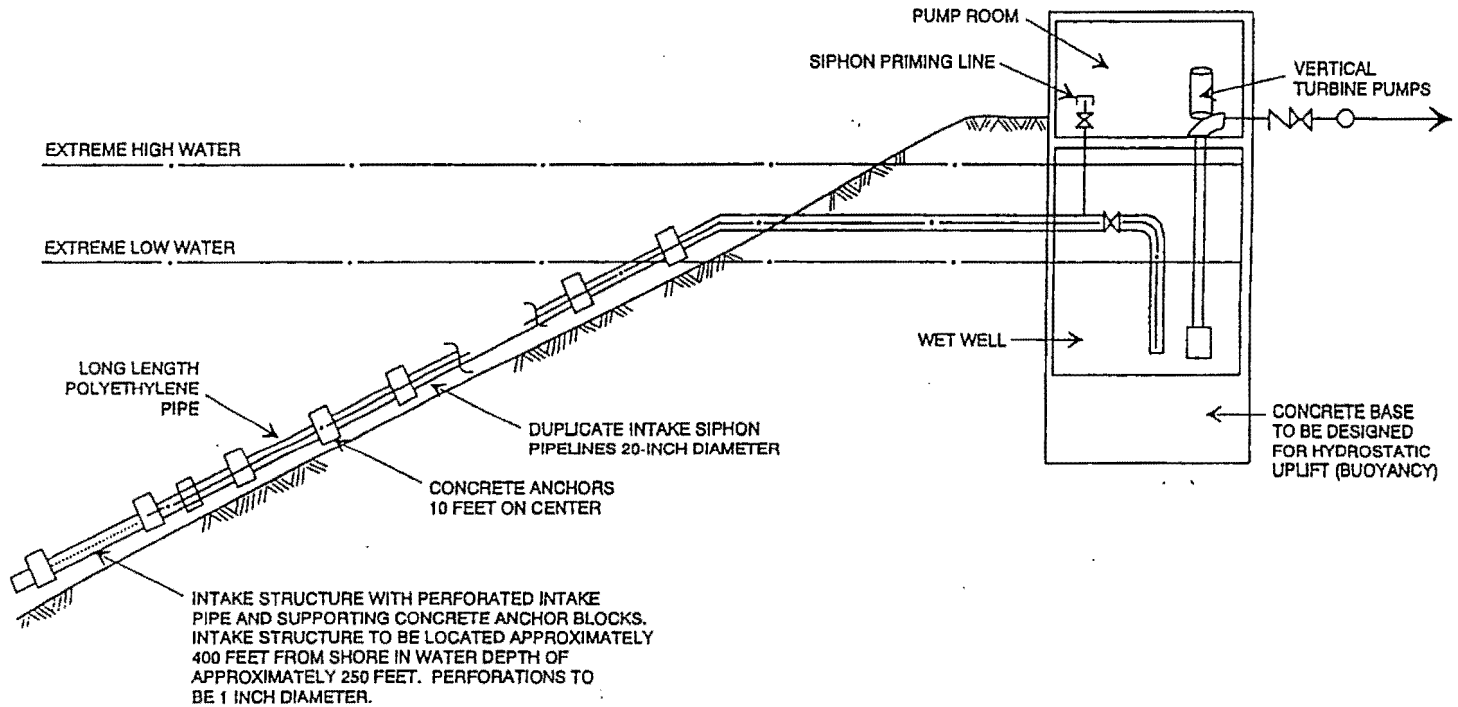
Seawater Outfall

The seawater outfall system will comprise a main collection sump or manhole on shore and a 20-24 inch diameter outfall pipe with perforated diffuser structure at the discharge end. The diffuser discharge structure will be located at a depth of approximately 50 feet to allow for mixing with the warmer and more biologically active surface waters. Treatment system will remove solids, pathogens, and residual chlorine to meet stale water quality standards at the point of discharge.

Notes and Comments

ALASKA SEA LIFE CENTER — LIFE SUPPORT SYSTEMS — SUMMARY DESIGN CRITERIA MATRIX — 18-Jul-94 13:05:29

ITEM	DESCRIPTION	NO. of TANKS #	TOTAL VOLUME gallon	TURN OVER TIME min	FLOW RATE gpm	NO. OF PUMPS #	PUMP POWER EACH hp	PUMP POWER TOTAL hp	FLOW THRU %	RECIRC %	FLOW to FILTERS gpm	HIGH RATE SAND & GRAVEL PRESSURE FILTERS DIAM. ft	L ft	AREA ft2	NO. #	RATE gpm/ft2	BIO FILTER IN SAND BOTTOM #	BIO FILTER IN EXT TANK #	OZONE DISINFECT SYSTEM lb/day	CHLORINE SYSTEM FOR RESIDUAL lb/day	UV DISINFECT SYSTEM uWs/cm2	TEMP oF	MAKEUP WATER @75 min/d gpm	FLOW THRU gpm	TOTAL INTAKE WATER gpm
A- RESEARCH TANKS - OUTDOORS																									
A-1	MAMMALS 12' dia.	1	3400	90	38	0	1.0	0.0	100%	0%	0											AMBIENT	0	38	38
A-2	MAMMALS 20' dia.	1	9400	90	104	0	1.0	0.0	100%	0%	0											AMBIENT	0	104	104
A-3	MAMMALS 35' dia.	1	72000	90	800	0	1.0	0.0	100%	0%	0											AMBIENT	0	800	800
A-4	MAMMALS 40'X60'	1	126000	90	1400	0	15.0	0.0	100%	0%	0											AMBIENT	0	1400	1400
A-5	4 MAMMALS 8'X4'	4	3800	90	42	0	5.0	0.0	100%	0%	0											AMBIENT	0	42	42
A-6	BIRDS 3'dia.	5	1050	90	12	0	2.0	0.0	100%	0%	0											AMBIENT	0	12	12
A-7	BIRDS 4'dia.	5	1875	90	21	0	1.5	0.0	100%	0%	0											AMBIENT	0	21	21
A-8	FISH/INV 12' dia.	4	13500	60	225	0	10.0	0.0	100%	0%	0											AMBIENT	0	225	225
A-9	FISH/INV 4' dia.	20	7500	60	125	0	1.5	0.0	100%	0%	0											AMBIENT	0	125	125
A-10	FISH/INV 30' dia.	2	42300	60	705	0	3.0	0.0	100%	0%	0											AMBIENT	0	705	705
A-11	RACEWAYS 4'X12'	8	7200	60	120	0	3.0	0.0	100%	0%	0											AMBIENT	0	120	120
A-RESEARCH TANKS - INDOORS																						AMBIENT	0	0	0
A-12	WET LAB #1	10	20000	60	333	0	3.0	0.0	100%	0%	0											AMBIENT	0	333	333
A-13	WET LAB #2	10	20000	60	333	0	3.0	0.0	100%	0%	0											AMBIENT	0	333	333
B- QUARANTINE																									
B-1	FISH	10	3000	60	50	20	0.5	10.0	0%	100%	50	1.0		0.8	10.0	6.4		10.0			30000	AMBIENT	3	0	3
B-2	BIRDS	10	3500	60	58	20	0.5	10.0	0%	100%	58	1.0		0.8	10.0	7.4				0.1	30000	AMBIENT	3	0	3
B-3	MAMMALS STG 1	8	10250	60	171	16	0.8	12.0	0%	100%	171	2.0		3.1	8.0	6.8				0.2	30000	AMBIENT	9	0	9
B-4	MAMMALS STG 2	8	10250	60	171	16	0.8	12.0	0%	100%	171	2.0		3.1	8.0	6.8				0.2	30000	AMBIENT	9	0	9
C- RESEARCH HABITATS																									
C-1	SEA LION	1	300000	120	2500	4	20.0	80.0	0%	100%	2500	3.5	12.0	42.0	6.0	9.9			9.0	2.2		AMBIENT	130	0	130
C-2	S OTTERS	1	150000	90	1667	4	20.0	80.0	0%	100%	1667	3.5	12.0	42.0	4.0	9.9			6.0			AMBIENT	87	0	87
C-3	S BIRDS	1	200000	120	1667	3	20.0	60.0	0%	100%	1667	3.5	12.0	42.0	4.0	9.9			6.0	1.5		AMBIENT	87	0	87
C-4	SEALS A	1	200000	120	1667	3	20.0	60.0	0%	100%	1667	3.5	12.0	42.0	4.0	9.9			6.0	1.5		AMBIENT	87	0	87
C-5	SEALS B	1	55000	120	458	2	10.0	20.0	0%	100%	458	3.5	8.0	28.0	2.0	8.2			1.6	0.4		AMBIENT	24	0	24
C-6	FISH & INV TANKS	10	42600	60	710	20	1.0	20.0	0%	100%	710	2.5		4.9	20.0	7.2	10.0				30000	AMBIENT	37	0	37
INTAKE & DISCHARGE EQUIPMENT																									
D-1	RESEARCH SUPPLY	1	328025		4259	4	75.0	300.0	100%	0%	0											AMBIENT	0	4259	4259
D-2	QUARINTINE SUPPLY	0	27000		450	2	0.8	1.5	0%	100%	0											AMBIENT	23	0	23
D-3	HABITATS SUPPLY	0	947600		8668	2	15.0	30.0	0%	100%	0											AMBIENT	451	0	451
D-4	QUAR + HABIT DISCH.	1	974600		9118	2	15.0	30.0	0%	100%	475	3.5	8.0	28.0	2.0	8.5			11.4			AMBIENT	475	0	475
D-5	TOTAL DISCH.	1	1302625		13377	0	5.0	0.0	0%	0%	0								0.0			AMBIENT	475	4259	4734
SUBTOTALS - A		72	328025		4259	0	50	0			0				0		0	0	0	0	0		0	4259	4259
SUBTOTALS - B		36	27000		450	72	3	44			450				36		0	10	0	0	36		23	0	23
SUBTOTALS - C		15	947600		8668	36	91	320			8668				40		10	0	29	6	10		451	0	451
SUBTOTALS - D		3					111	362							2				11	0	0				
TOTALS		126 #	1302625 gallon		13377 gpm	108 #	254 hp	726 hp			9118 gpm	0 #			78 #		10 #	10 #	40 lb/day	6 lb/day	46		475 gpm	4259 gpm	4734 gpm



NOTES:

1) NUMBER OF PERFORATIONS IN INTAKE STRUCTURES TO ACHIEVE INTAKE VELOCITY OF LESS THAN 0.1 FEET PER SECOND.
2) LOCATION OF WET WELL AND PUMP ROOM TO SUIT BUILDING COMPLEX AND BEST ARCHITECTURAL LAYOUT.
3) INTAKE PIPELINE DIAMETERS TO BE FINALIZED AT DESIGN STAGE.

CONCEPT FOR SEAWATER INTAKE SYSTEM

Job No. 28347-002-160
DAMES & MOORE

IMS Infrastructure Improvement Project
Seward, Alaska
FIGURE 2-11

Special Design Requirements

B. EXISTING IMS SEAWATER SYSTEM AND RESURRECTION BAY DISCUSSION

June 1, 1994, a meeting was held at IMS to discuss the existing IMS Seawater System. The following were in attendance: Dr. A.J. Paul, IMS; Ted Maranda, D.W. Thomson; and Raj Bhargava, RBA. The following items were discussed:

- Tide change is 5 meters or 17 feet from low to high tide.
- Resurrection Bay is a glaciated fjord in warm (20°), high turbidity, low salinity in the upper 20 meters.
- Deep pacific ocean: 32-34 parts salinity; 3-11°C; particle free, low silt content at lower depths
- The cleaner water is at 70 meters at least. This is into deep diving and beyond scuba gear capability. The intake screens will have to be accessed by divers with decompression, if necessary.
- Fresh water input is from glaciers or creeks with snow melt and rainfall.
- The real fines can be carried out the farthest in the silt plume.
- The dissolved oxygen is near saturation because the water is cold and little biological activity due to the cold temperatures and lack of light. They have monitored 100% oxygen saturation over a long time. The temperature variation has been recorded.
- Late fall has the warmest water. IMS relies on natural variations in ambient water temperatures rather than controlling by heating/cooling to vary the input for their experiments. (Not like the thermal marking of fish at Snettisham).
- Have to degas the water - to control nitrogen for fish (not mammals, birds or invertebrates).
- The original design for the Alaska SeaLife Center by Enartec relied on a once-thru system. The larger pools and rehab exhibits can be handled with 5% make-up water with the rest recirculated. This would give a 1-day or 2-day replenishment. From a research standpoint, the recirculated water will just get warm. Marine mammals and birds are able to handle temperature variations and salinity variations.

Notes and Comments

- King Crab has very low tolerance for high temperatures. Pacific Ocean deep fish would also need low temperatures. The lower temperatures also reduces their metabolism rate, lowers growth and they eat less, fight less.

- Current flow is 400 gpm or 576,000 gpd. At maximum, research will use 2,000 gpm for research. This 2,000 gpm figure is based on outside/inside tanks for research, per A.J., considering five labs at 400 gpm each.

- Cod and halibut would get sucked into the open pipe intake. For the last 3 years, a perforated pipe with 1 inch diameter holes; 1 foot apart; 4 rows; 8 feet long, has been installed and operated without sucking in fish. Fish and Game will dictate velocities for limiting intakes.

- The water quality and salinity of Resurrection Bay are relatively constant at 70-100 meters.

- Only 15 days per year the water clarity is bad due to silt - also happens when visitation is occurring. So filtration has to be provided in exhibit areas.

- The IMS researchers can live with the low amount of silt. On the public side, the silt lasts for 2 days at a time with low tide, high runoff, etc. A sand filter can only remove 80+ micron size silt.

- For research, they prefer an overhead tank (constant head). Also a coarse filter.

- The Hood Lab building has no ozone. Since the non-salmonid fish are local, their discharge water does not have to be treated. Any salmonid discharge has to be treated before water is discharged. For ozone treatment of the mammals, the cost would be lower than for other treatment methods.

- At 75 meters depth, 480 feet out, is the existing IMS water intake, and it has been working very well. IMS also can do a underwater hydroacoustic bottom map at very little cost, unless data is available elsewhere. In the last 15 years, they have not had to clean the intake structure at all.

- Under current law, salmonid water and marine mammal effluent has to be treated. The design should allow for full treatment, in the future particularly because of transient diseases. The regulations keep evolving in this regard.

- Research experiments vary from 3 months to 3 years. Reliability is an important issue. IMS needs standby power. A Caterpillar generator provided standby power to Hood Lab. Just securing a King Crab costs $1,000 and there is a high investment in lab experiments.

Notes and Comments

Special Design Requirements

- Most invertebrates can survive a couple of hours without flowing water if tanks area aeriated. Fish need uninterrupted supply. Supply uninterrupted water for water breathing organisms. The recirculated systems can go down for short periods. Power outages in Seward are usually in the winter.

- Fresh water demand for IMS research is projected at 50 gpm. Fresh water demand for ADF&G Fish Genetics Program is 300 gpm. Do not use City water.

- Diatoms grow on any surface where there is light because of nutrient rich water. But there is not growth inside existing IMS seawater intake pipes.

- A.J. Paul uses a turnover rate of once per hour in the lab tanks. He feels that this is lavish use of water, since there is plenty available in the system. It could possibly be reduced to once every two hours.

- Fybroc pumps are 7-1/2 hp each, 200 gpm, 50 ft head. One set feeds Hood Lab and the second feeds outside tanks, oyster farm and hatchery.

- Design for 4,000 gpm of sea water intake/supply of which 2,000 gpm is for research use; 1,500 gpm is for fish culture; 500 gpm for mammals; 300 gpm for Fish and Game fresh water; and 50 gpm for IMS fresh water.

- Calcium hypochlorite is being used for disinfection. Salmonic effluent water should not go to the tide pool. It will need to be treated before discharge.

- A big boom crane is available on site. The machine shop can do a lot of repairs with a full-time maintenance engineer.

- The maintenance staff will need to be on board at time of completion. The mammals and birds will have to wait until facility is open - no place to warehouse any animals in the interim at the existing IMS facility.

Notes and Comments

Special Design Requirements

C. HABITAT DESIGN CRITERIA

Marine Mammals and Marine Birds

Architectural Requirements

Cleanability of all natural and artificial surfaces.

Naturalistic setting which simulates the natural habitat of Marine Mammals and Birds.

Wet pools, dry haul out and resting areas for Marine Mammals per USDA Guidelines.
Wet pools, cliffs and dry resting areas for Marine Birds.

Various levels of exposure to and shelter from wind, rain, snow, sun.

Separation of Species as needed through Design Features.

Clear panels for scientific and public and underwater viewing.

Heating of rock surfaces should be provided in winter months.

Water temperature controls will be provided to keep water from freezing.

Water depth needed for each Marine Mammal species - 12-15 feet deep

Diving / Swimming Depth should be 12 - 15 feet for Marine Birds (5'-0" minimum allowed).

Burrows should be human-accessible for handling adults/chicks with visual monitoring ability for behavior studies. Sloping access from water to artificial cliff/burrow living habitat.

Research Habitat access should be located within reasonable distance to labs and other work areas for easy transportation of Marine Mammals and Marine Birds.

Habitat design for Marine Mammals must meet USDA Requirements and Fire and Building Codes.

Design regulations are being developed for Marine Birds. Definitions for fly zones and other design requirements are expected.

Notes and Comments

Structural Requirements

Corrosion control of concrete tanks must be provided.

No untreated metals - use fiberglass or plastic parts. All ferrous metals must be galvanized or epoxied.

Higher density of concrete, 4,000 psi with silacafum additive.

Loads - Dead loads, wave, seismic, snow loads.

Life Support / Mechanical Requirements *(see Life Support page 63 for Water Requirements)*

High quality seawater supply

Appropriate rate of water turnover for animal health and visibility.

Ability to drain tanks as needed in a reasonable amount of time. Drains must be able to handle solids like fecal matter, bits of fish, etc. Treatment of waste water must be provided.

Temperature control of water must be provided.

Treatment and disinfection of habitat tanks must be provided.

Electrical Requirements

Appropriate levels of lighting for behavior studies and observation.

Notes and Comments

Special Design Requirements

ASLC/IMS
Naturalistic Habitat Research Tanks
Preliminary Data

Cambridge Seven Associates, Inc.
27 May 1994

Concept Design Research Habitat Criteria

Number of Systems	System Loading	Animal Capacity (No. Animals)	Water Surface Area (SF)	Dry Surface Area (SF)	Average Water Depth (FT)	Working Water Vol. (US Gals)	Notes
1	Marine Birds	Up to 125	1,800	700	14	200,000	3:1 = Water to Plan Land 1:3 = Water to Total Land
1	Pinnipeds A. (Phocidae)	Up to 8	1,800	1,500	14	200,000	8° = Max. Slope for DSA
	Pinnipeds B. (Phocidae)	Up to 4	500	100	14	55,000	8° = Max. Slope for DSA
1	Pinnipeds C. (Otariidae)	Up to 4	2,500	2,500	14	300,000	20° = Max Slope for DSA
1	Sea Otters	Up to 4	1,400	300	14	150,000	
8 - 10	Fish & Invertebrates	N/A	1,000	N/A	6	42,600	
Total			**9,000**	**5,100**		**947,600**	
					Say	**1,000,000**	

Special Design Requirements

B. USDA Construction and Design Requirements

Notes and Comments

The *U.S. Department of Agriculture* maintains standards for the health and husbandry of marine mammals. These standards include minimum space and construction requirements. (Source 2)

Habitats / Tanks / Pools

Indoor and outdoor housing facilities for marine mammals shall be structurally sound and maintained in good repair, to protect the animals from injury, to contain the animals and to restrict the entrance of unwanted animals.

Reliable and adequate sources of ***water and electric power*** shall be provided. Written contingency plans must be submitted to and approved by Veterinary Services regarding emergency sources of water and electric power.

Adequate ***drainage*** shall be provided for all primary enclosure pools and must allow for rapidly emptying pools when necessary. Drainage shall be provided for enclosures and areas immediately surrounding pools.

Provisions shall be made for ***disposal of animal and food wastes***, dead animals, trash and debris.

Washroom facilities shall be provided to ***maintain cleanliness*** among employees and attendants.

USDA Outdoor Facilities Requirements

It is anticipated that all proposed marine mammal habitats, tanks and pools will be located in outdoor areas.

Marine mammals shall not be housed in outdoor facilities unless ***the air and water temperature ranges*** which they may encounter during the period they are so housed do not adversely affect their health and comfort.

The ***water surface*** of pools in outdoor primary enclosures housing pinnipeds shall be kept sufficiently free of solid ***ice*** to allow for entry and exit of the animals.

Natural or artificial ***shelter*** which is appropriate for the species concerned, when the local climatic conditions are taken into consideration, shall be provided for all marine mammals kept outdoors to afford them protection from the weather or from direct sunlight.

All marine mammals shall be provided ***with protection from abuse and harassment by the viewing public*** by the use of a sufficient number of employees or attendants to supervise the viewing public, or by physical barriers, such as fences, walls, glass partitions or distance, or both.

USDA Marine Mammal Sizes

Harbor Seal	
Average Adult length	
Male	5.6 feet
Female	4.9 feet
Steller Sea Lion	
Average Adult length	
Male	9.4 feet
Female	7.9 feet
Sea Otter	
Average Adult length	4.1 feet

USDA Marine Mammal Space Requirements

Volume of Water
Dry Resting Area (DRA)
Minimum Horizontal Distance (MHD)
Minimum Depth
Minimum Water Surface Area

Notes and Comments

C. LABS

1. Wet Labs

Wet Labs must be designed such that they can be ***hosed down*** as needed. "Seawater proof" walls and ceilings and fixtures must be provided.

Separate floor drains must be provided for both waste water to be untreated and waste water to be treated. Location of floor drains must allow a flexible arrangement of tanks with the labs. ***Clean out plugs*** must be provided.

Wet labs must be provided with good ***ventilation***. The ability to ventilate area with fresh air is desirable.

Wet labs should have their own control of ***lighting***. Some natural lighting is desirable.

Electrical outlets should be located high on walls to protect from seawater. All outlets must be GFI protected. Several individual circuits should be provided within each wet lab area.

Nonskid floor surfaces must be provided.

3" PVC ***overhead supply pipes*** for seawater with drops every 4'x4' feet.

Wet labs should have separate air temperature control. Anticipated temperature range for wet labs is 40° to 70°F (3° to 15°C).

Large garage style doors with ***fork-lift access*** to wet labs should be provided.

In wet labs all piping of PVC construction with ***no copper or other metal fittings*** in system or above tanks. All pipes should be ***insulated*** to minimize condensation. Clean outs must be provided.

Wet labs should be ***alarmed*** for seawater failure, flooding or any interruption of water flow.

Controlled access to labs by researchers.

No ***spark lighting*** in wet labs.

Notes and Comments

Special Design Requirements

Ability to easily restructure laboratory (relocate tanks) and work areas. ***Flexibility in design*** to allow change and expansion as necessary. Flexibility should also be provided to allow quick correct and disconnect of water supply and effluent lines allowing easy interchange of tanks within lab. Custom tank configuration (both number and size are needed to meet specific research project requirements).

Air compressor system which delivers 100 psi high pressure air plus 55 psi clean, dry filtered low pressure air must be provided.

All ***hardware*** (hinges, handles, etc.) on benches and shelving should be plastic to avoid ***corrosion***.

Wet labs should be located with a high percentage of surface area and openings to the exterior to keep ***temperature*** close to outside temperature as needed.

2. Dry Labs

Central Research Dry Lab

A central Research Dry Lab will be provided for all Marine Mammal, Marine Bird and Fish scientists. The lab will provide testing for all scientists and will house most research, testing and experimental equipment which will be shared by all researchers.

The Central Dry Lab will be able to conduct biological testing, water quality testing, and diagnostic and medical testing.

The Central Dry Lab will include a series of small rooms to isolate certain equipment and/or testing processes. These independent rooms within the Central Dry Lab may be used for the following:

- Electronics Lab
- Photographic Darkroom
- Toxology
- Bacteriology
- Isotopes
- Centrifuges and other noisy equipment
- Vibration dampened room (sensitive instruments)

The Central Dry Lab would have a work station for a computer as well as a lab technician.

See Equipment (page 34) for proposed Lab Equipment.

Notes and Comments

Special Design Requirements

Auxiliary Research Labs

Four auxiliary Research Labs would be provided for specific research projects:

Marine Mammals (1)
Marine Birds (1)
Fish and Invertebrates (2)

Dry Labs Criteria

Casework (work surfaces) must be provided which are ***durable*** and chemical r*esistant.*

Fume Hoods must be provided for experiments involving noxious vapors.

Storage for acid and other hazardous chemicals.

One ***sink*** per 10 linear feet of work surface space.

Work surfaces for both working while ***sitting*** and ***standing***.

Minimum of 2 electrical ***outlets*** per 4 linear feet of wall and four outlets per 3 linear feet of work surface. One 220v outlet on each wall.

Safety showers, emergency eye wash stations and ***floor drains*** must be provided in each dry lab.

Handicap access throughout labs.

Modular design to facilitate changing space requirements of research projects and changing users.

Air, gas and ***fresh water*** supplies overhead utilities should be provided for flexibility.

Provisions for linking offices and laboratory into a ***data network***.

Notes and Comments

Special Design Requirements

Lab Storage

220 v, 3 phase, 150 amp outlets (5) in area with 5 foot wide access (for flow cytometer and other large instruments with high power requirements).

Environmentally controlled storage for scientific/electronic equipment used only intermittently.

Storage for hazardous chemicals must be provided.

Notes and Comments

Special Design Requirements

2.3.2 Permits and Regulations

The following permits and agency reviews will need to be in place for the construction of the IMS Infrastructure Improvements/Alaska SeaLife Center.

Federal

1. National Environmental Policy Act (NEPA)
   Environmental Assessment

2. U.S. Army corps of Engineers
   Section 10/404 Permit to discharge fill

3. U.S. Environmental Protection Agency
   Stormwater pollution Prevention Plans for compliance with NPDES General Permit for Stormwater Discharges for both construction and operational periods, spill prevention control and counter measure plan

4. U.S. Department of Commerce, National Fisheries Service
   Marine Mammal Permit
   Section 7 Endangered Species Consultation

U.S. Department of Agriculture

1. Animal Holding Permits

2. U.S. Department of Interior, Fish and Wildlife Service
   Section 7 Endangered Species Consultation
   Migratory Bird Permit
   Marine Mammal Permit

Notes and Comments

Permits & Regulations

State of Alaska

1. State of Alaska, Division of Governmental Coordination
   Alaska Coastal Management Program Consistency Determination

2. Alaska Department of Environmental Conservation
   Section 401 / Water Quality Assurance

3. Alaska Department of Environmental Conservation
   Hazardous Materials Site Plan Review

4. Alaska Department of Environmental Conservation
   Wastewater Disposal Plan Review and Wastewater Disposal Permit

5. Department of Natural Resources
   Water Rights

6. Department of Natural Resources, State Historic Preservation Office
   Section 106 Finding

7. State Fire Marshal
   Life and Safety Plan Check

8. Alaska Department of Fish and Game
   Fish Transportation Permit

Kenai Peninsula Borough (KPB)

1. Consistency with Kenai Peninsula Borough Coastal Management Plan

2. Floodplain Development Permit Review

City of Seward

1. Rezone and replatting of property

2. Conditional Use Permit

3. Building Permit

4. Easement or lease of City Tidelands

Notes and Comments

Permits & Regulations

2.4 SITE REQUIREMENTS

2.4.0 General Site Information

A. REGIONAL CONTEXT

Seward lies between Prince William Sound and Cook Inlet on the Kenai Peninsula at the north end of Resurrection Bay. Half of the population of Alaska lives within a three hour drive. The name Resurrection Bay is translated from the Russian name, Voskrensenka Gavan. In 1792, the Russians built a shipyard in the Bay. The city was the historic gateway to Alaska's interior during the gold rush and the opening of the Territory. Both the historic Iditarod Trail and the Alaska Railroad have their tidewater trail and railheads in Seward. The site for the IMS Infrastructure Improvements/Alaska SeaLife Center is located near these points of origin.

Today, the city is the gateway to Kenai Fjords National Park of 580,000 acres of icefield, active glaciers and fjordlands. Beyond the mouth of Resurrection Bay rise Chiswell and Pye Islands of the Alaska Maritime Wildlife Refuge, breeding rookeries for Steller sea lions and northern seabirds. Sea otters swim in Resurrection Bay and the outer coastal bays alongside whales, seals, fish and marine invertebrates. This visually spectacular and biologically rich setting is ideal for a marine research and educational center. Its easy access by car, bus and rail to and from Anchorage provides visitor traffic that will support the operational funding. Seward is located near the center of the Exxon Valdez Oil Spill area. Its location west of Prince William Sound and on the coast of the Gulf of Alaska is ideal for the study of the marine resources that were, and may continue to be, exposed to the threats from oil spills.

B. TOWN, SITE AND WATERFRONT CONTEXT

Location

The site proposed for the IMS Infrastructure Improvements is adjacent to the University of Alaska's (UAF) Institute of Marine Sciences' (IMS) Seward Marine Center (SMC) campus on the city's southern edge, facing Resurrection Bay. The City of Seward has made the land available for the IMS Infrastructure Improvements.

Seward Growth

The recent growth of the city has been predominantly at its northern end with the construction of the Port of Seward, the Small Boat Harbor and Marina, the Kenai Fjords Visitor's Center and the attendant retail and commercial businesses that serve the tourist industry. This pattern of development has unfortunately weakened the downtown center and the southern sections of the city, including the esplanade or pedestrian park on the city's eastern shore.

Notes and Comments

Site Information

Site Traffic
This waterfront is heavily used for RV and tent camping during the summer months, particularly during the Silver Salmon Derby.

C. EXISTING USES

The site is currently occupied by the ***Northern Stevedoring Warehouse***, a ***welding shop,*** the ***Youth/Teen Center*** and the ***Fourth Avenue Dock***. The Dock serves the Alaska Marine Highway system as the landing for the ferry M/V Tustumena as well as other commercial marine interests.

The ***original depot building*** for the ***Alaska Railroad*** is also located on the site, having been moved from its original location in 1917. It currently serves as the ticket office for the Alaska Marine Highway System. The existing terminus of the railroad is at the northern end of the town near the small boat harbor/marina and the Port of Seward.

The Ladies Park, a very popular city owned RV park and campground are located to the North and East of the site.

D. IMS CAMPUS: EXISTING PROGRAMS AND FACILITIES

The University of Alaska Fairbanks (UAF), Institute of Marine Science (IMS) carries out its shore based activities in Seward. The Seward Marine Center (SMC) facility has been operational since 1970. The program consists of ***vessel operations, research*** and ***education***. The state's only oceanographic vessel, the R/V Alpha Helix (133'), operates from Seward and supports most of the oceanographic research done in the Gulf of Alaska and Bearing Sea. The National Science Foundation is currently designing an ice breaker (330') that will operate from Seward and Provide access to the Arctic Ocean. A variety of small vessels (<30') are available for local research. The facility has warehouse and docking facilities, machine shop, and staff to support oceanographic vessels.

Notes and Comments

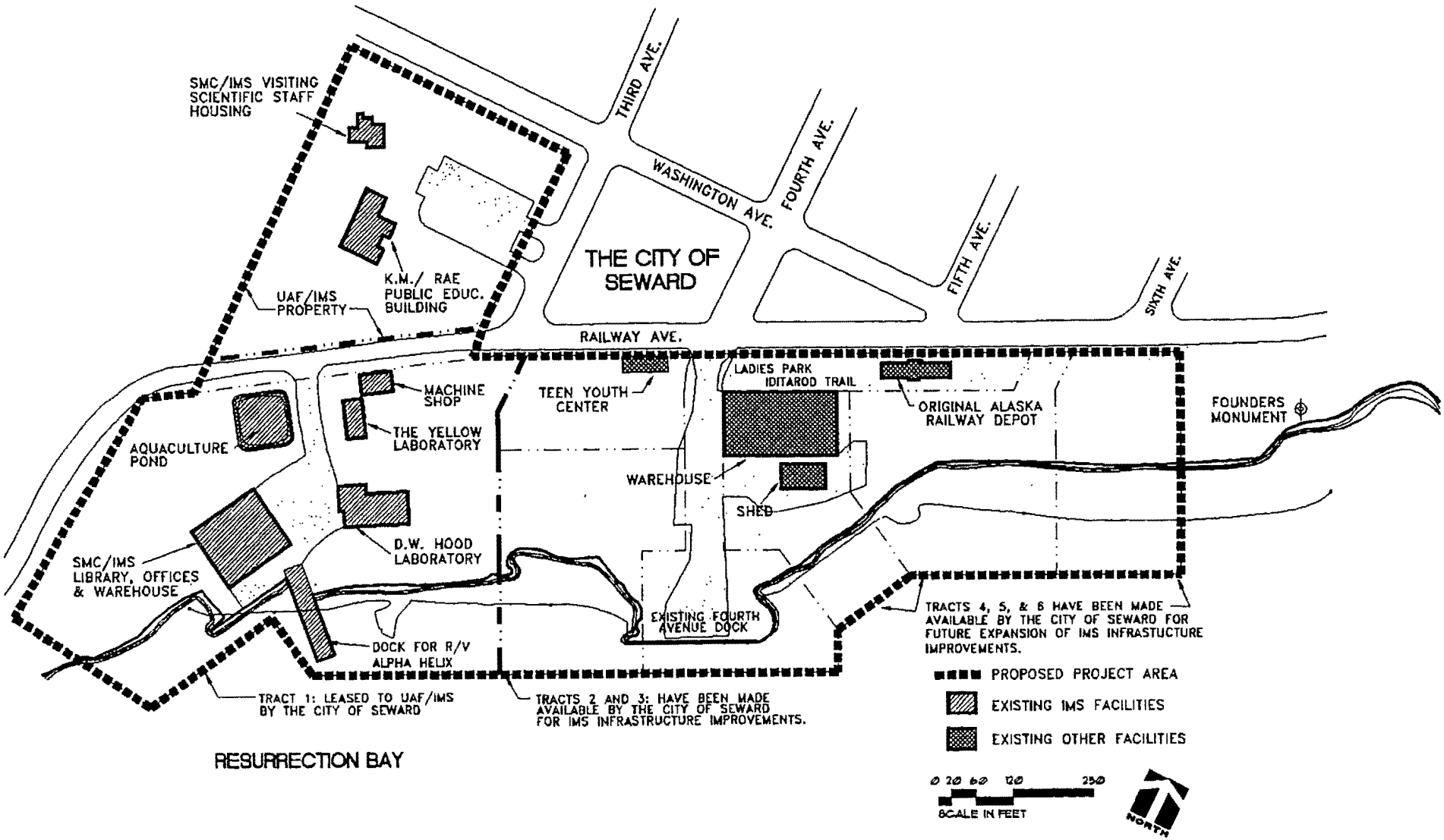
Site Information

The laboratory at Seward has the only running seawater system in the northern Gulf of Alaska region and a variety of marine biological and medical research is undertaken through the University research and graduate student training program. The areas of study include oceanography (physical, chemical, biological), marine biology, physiology and ecology. The UAF medical program uses the Seward facility to conduct their joint UAF-Russia medical research projects. The Seward Area Native Association is actively involved in shellfish aquaculture at the laboratory and the Alaska Department of Fish and Game is conducting a siting study for the Alaska Shellfish Hatchery and Technical Center that may lead to establishing a shellfish research laboratory and hatchery on the IMS campus.

The current IMS facility has two marine science laboratories including the ***Hood*** physiology and medical research ***lab*** (4,000 sq. ft.) and the ***Marine Biology Lab*** (1,540 sq. ft.). An educational program is operated from the ***Rae Public Education Building*** (5,000 sq. ft.). This public service program disseminates the results of marine science research to the public, science educators, policy makers and researchers from other institutions.

Notes and Comments

Site Information



PROPOSED PROJECT AREA
INSTITUTE OF MARINE SCIENCE INFRASTRUCTURE IMPROVEMENTS

2.4.1 Site Design Requirements

A. ZONING AND OWNERSHIP

The site's current zoning is a combination of Central Business District (CB), Institutional (INS) and Industrial (I). It is the intent to rezone the project site as CB. Tracts two, three and four are zoned as CB, while five and six are defined as Industrial (I).

Tracts one and two, which are currently occupied by the Institute of Marine Sciences, are classified as INS.

The narrow strip of land containing the Ladies Park, a portion of the Iditarod Trail and the Railway Depot building are zoned as Park. The CB classification requires no setbacks and allows for 100% lot coverage.

The INS classification requires a front setback of 20 feet, a side setback of 10 feet, and a back set back of 15 feet with a limitation of 50% coverage of the lot. The building height is restricted to 34 feet above grade.

Under the approved land use, "Museum," the IMS Infrastructure Improvements is a use that would be permitted under the existing ordinance, with the exception of the Research/Veterinary Program. The city has suggested that it would prefer to grant a Conditional Use Permit (CUP).

The subdivision, which is formed by tracts one through six, has been surveyed but has not been platted. Lots 2, 3, 4, 5, 6 and the 4th Avenue right-of-way would be surveyed and platted as one tract for "transfer" to this project.

Notes and Comments

B. PARKING AND TRAFFIC

Notes and Comments

Off Street Parking

Education component visitors will arrive in Seward by one of four primary modes of transportation: cruise ships, the Alaska Railroad, tour buses and private car and/or recreational vehicle (RV). Those visitors arriving by rail, ship or tour bus will disembark near the Small Boat Harbor and Marina. They will then come to the IMS Infrastructure Improvements either by bus, public transportation or by walking.

It will then be necessary to design sufficient parking for the number of buses, private cars and RV's that will arrive at the Center. The provided number of spaces should certainly be adequate for the off-season traffic from schools and the general public from throughout the Alaskan market area.

The parking need, estimated to be some 200 vehicles, 50 for staff parking and 150 for visitors can be contained on site by the construction of a new parking lot to the west of the new building for 150 cars and 15 to 20 R.V.'s, and a 50 space lot north of the existing parking lot at the Rae Building on the IMS Campus.

A drop-off will be provided for visitors arriving by cruise ships, trains and tour buses.

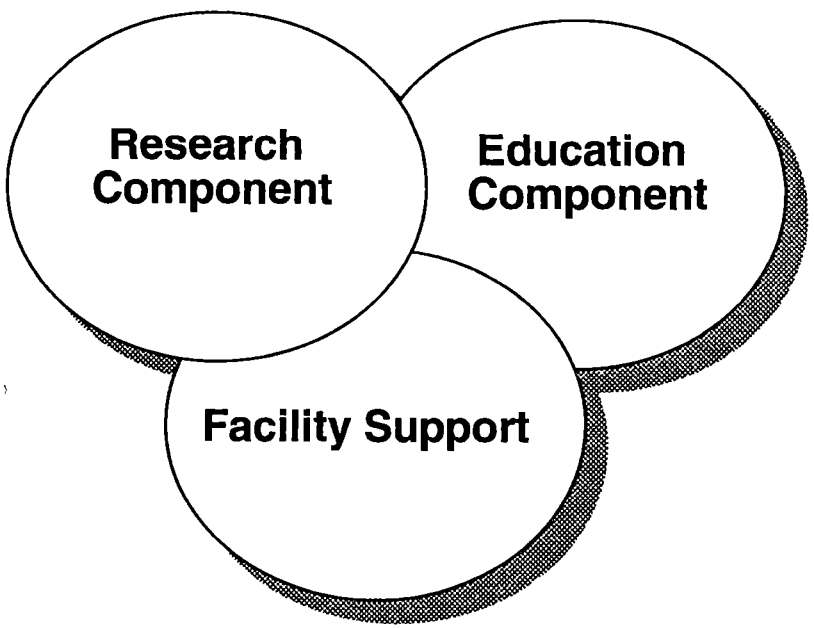
C. SITE SIZE

Gross Square Footage (not including Ladies Part/Depot)	=	254,800 SF	=	5.85 acres
Less				
Approximate Site Coverage for Building/Outdoor Research and Habitat	=	80,000 SF	=	1.84 acres
Parking				
150 Spaces at 400 SF each	=	60,000 SF	=	1.58 acres
15 RV Spaces at 600 SF each	=	9,000 SF		
Balance				
Site Deveopment/Marine Work	=	105,800 SF	=	2.43 acres

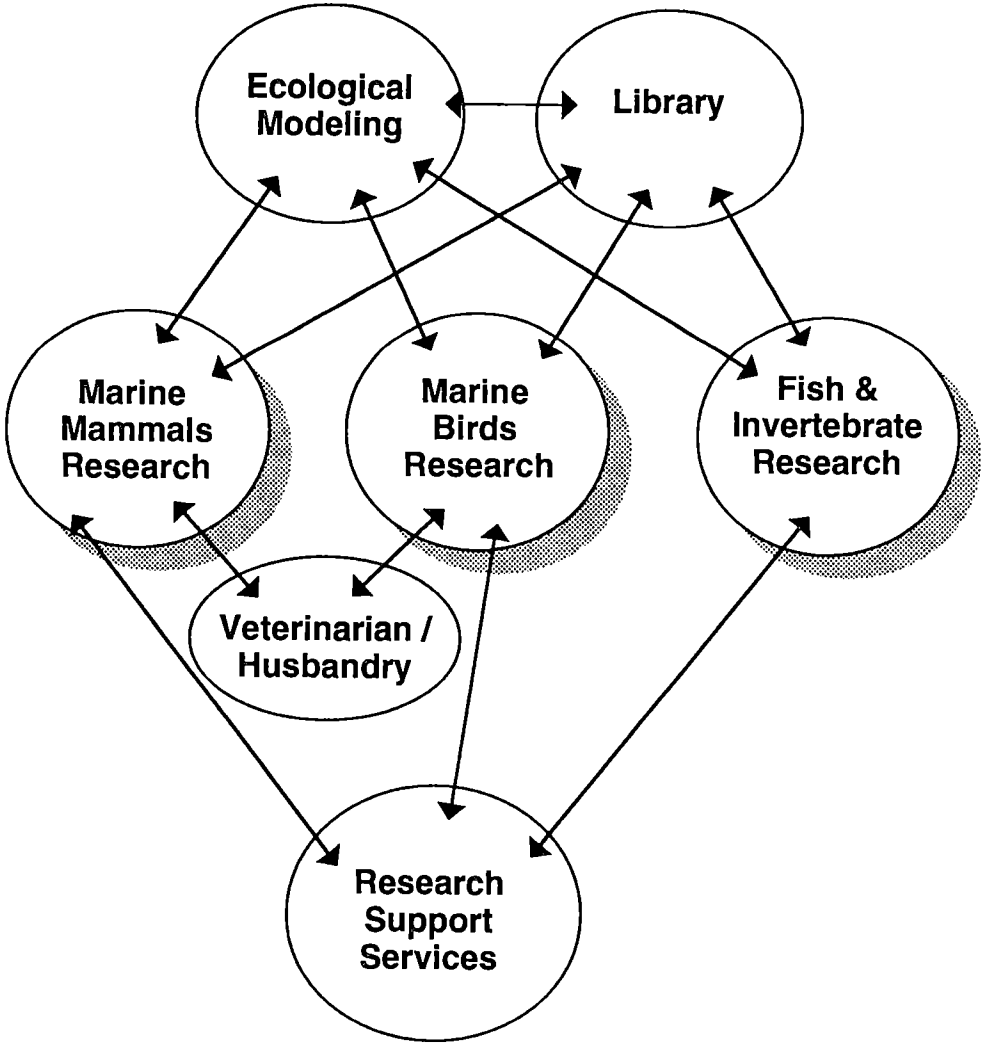
Site Requirements

CONCEPTS

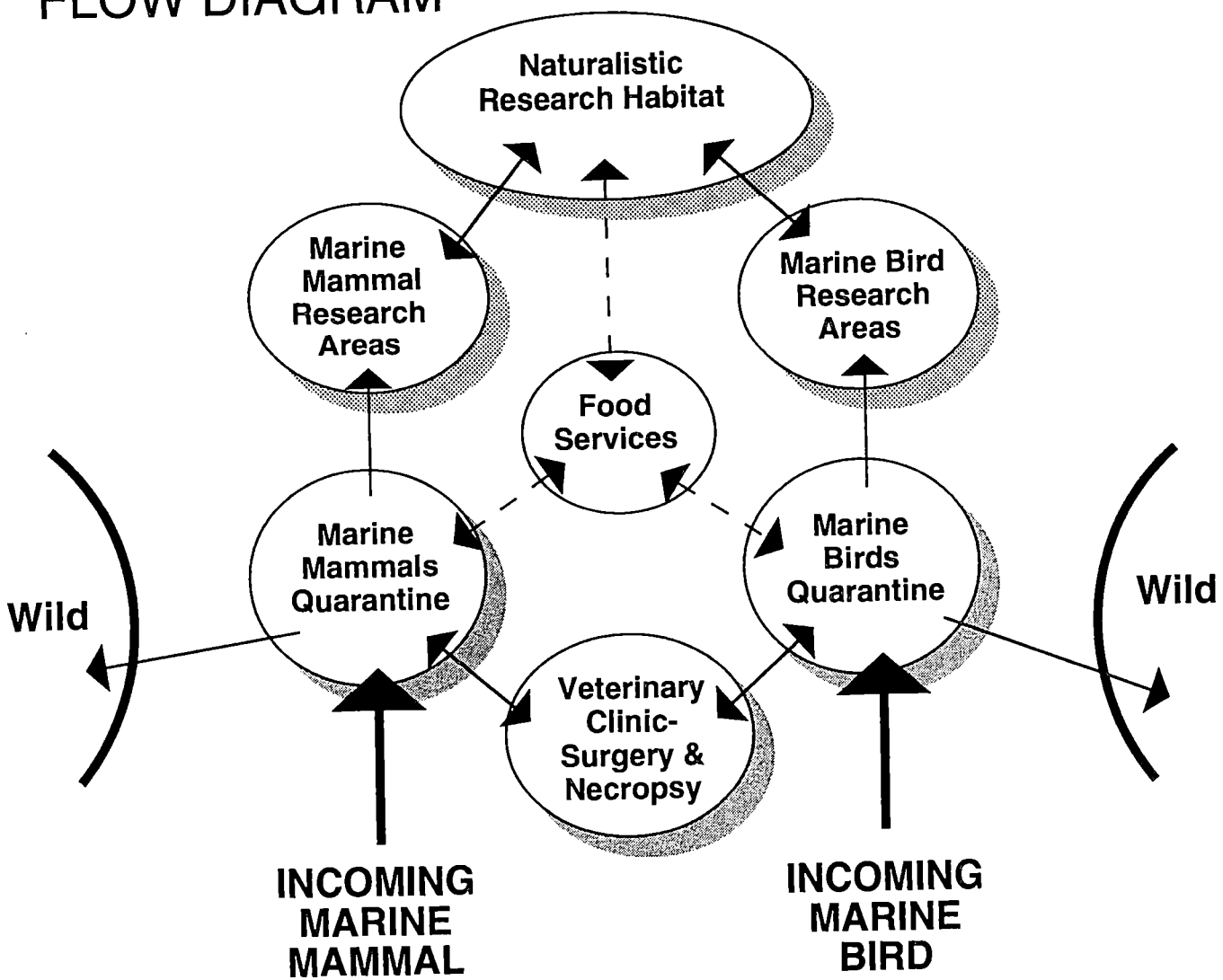
PROJECT ORGANIZATION



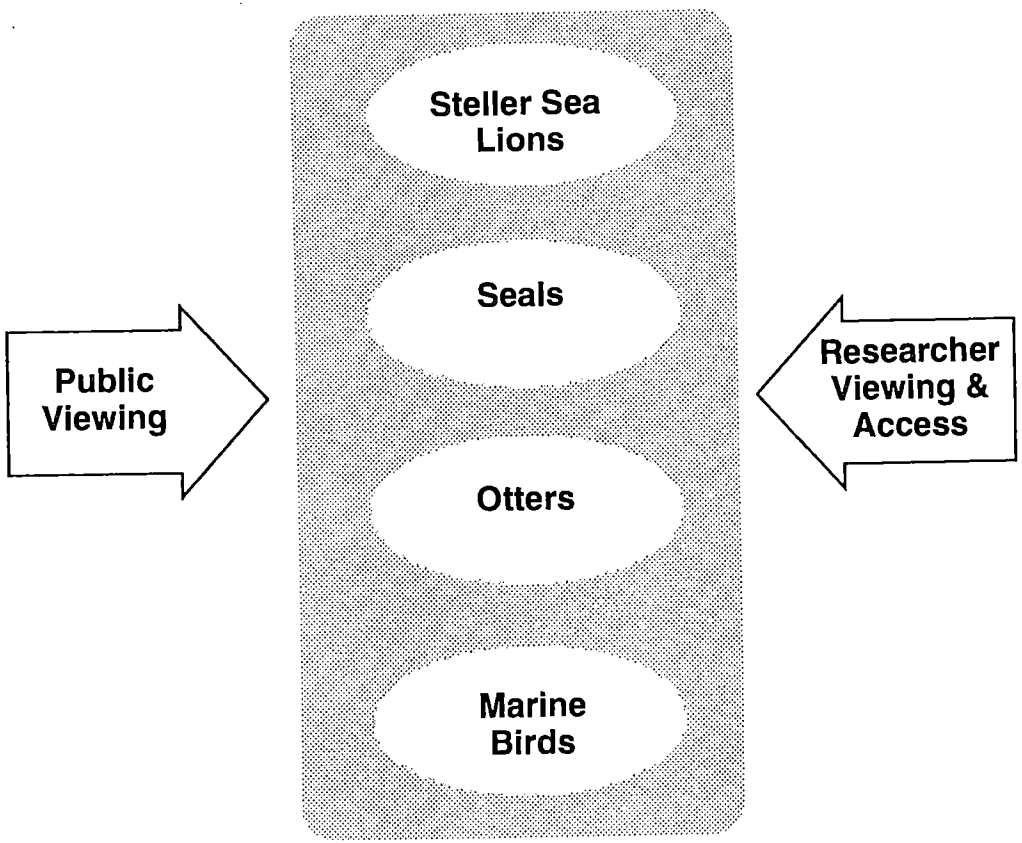
RESEARCH COMPONENT



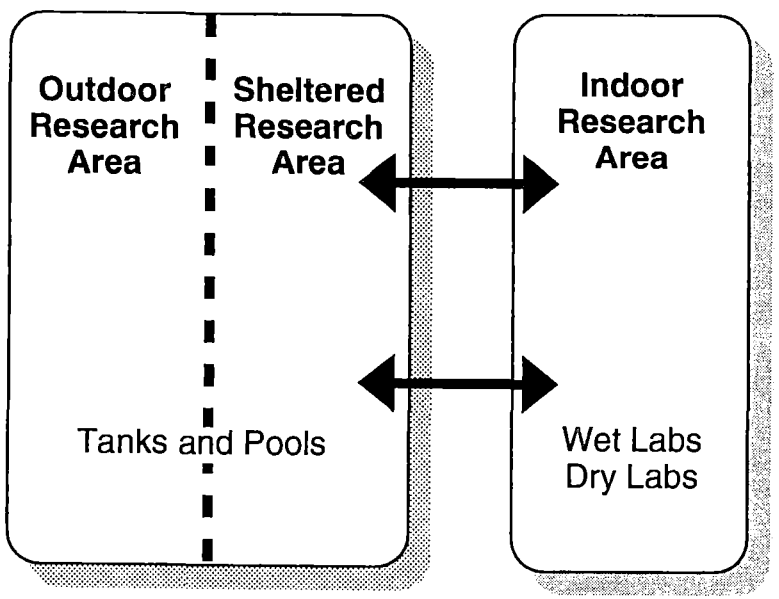
MARINE MAMMAL & MARINE BIRD FLOW DIAGRAM



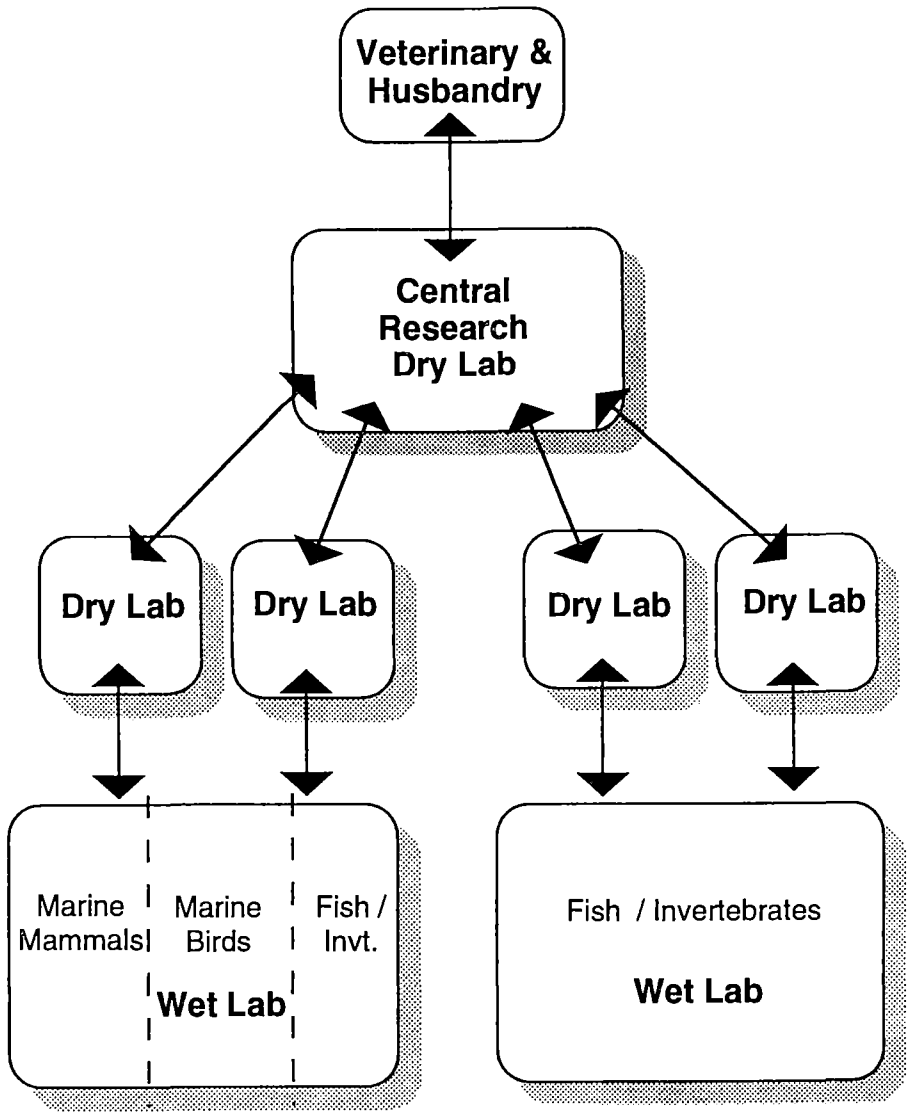
RESEARCH HABITAT VIEWING & ACCESS



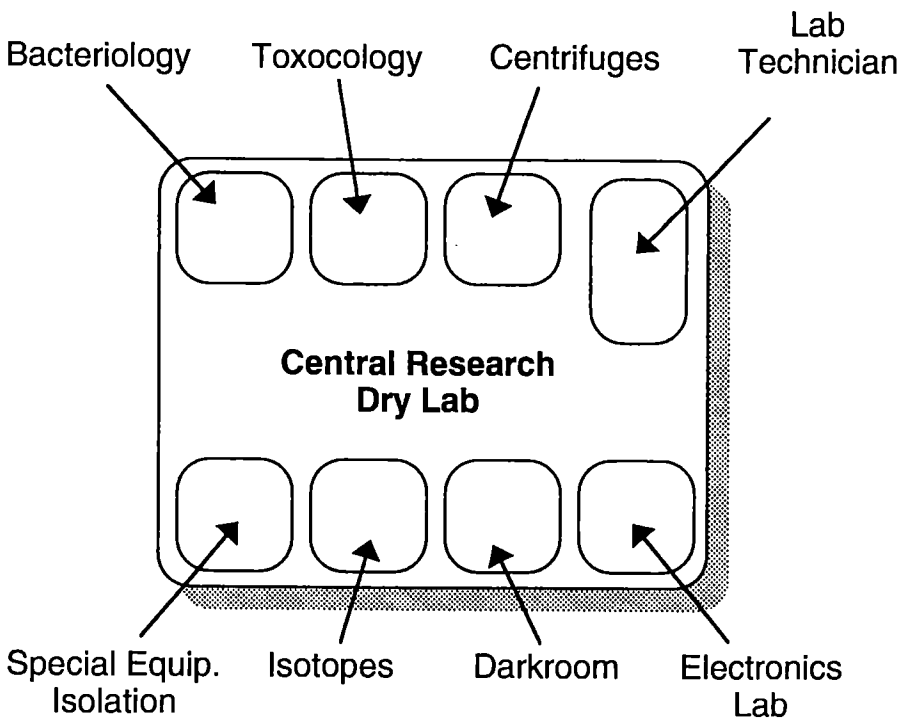
RESEARCH LAB DESIGN CONCEPT



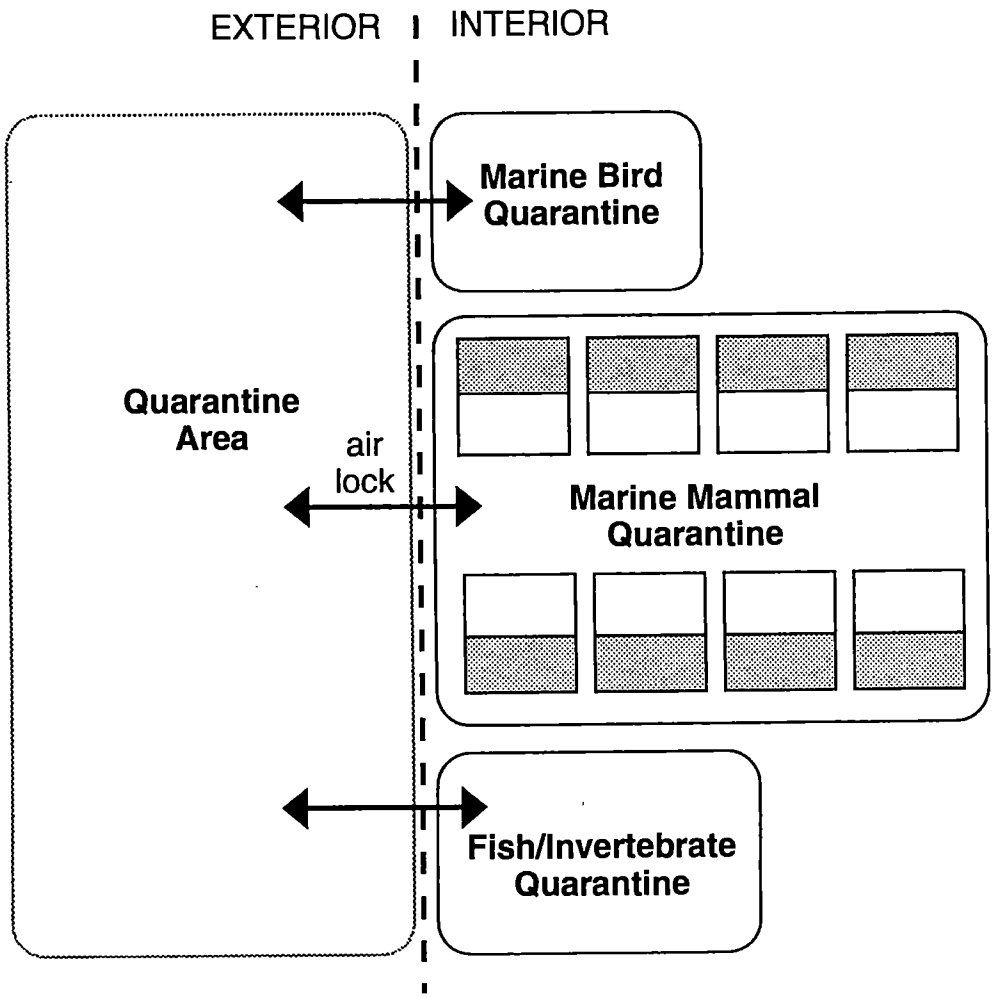
RESEARCH LAB CONCEPT



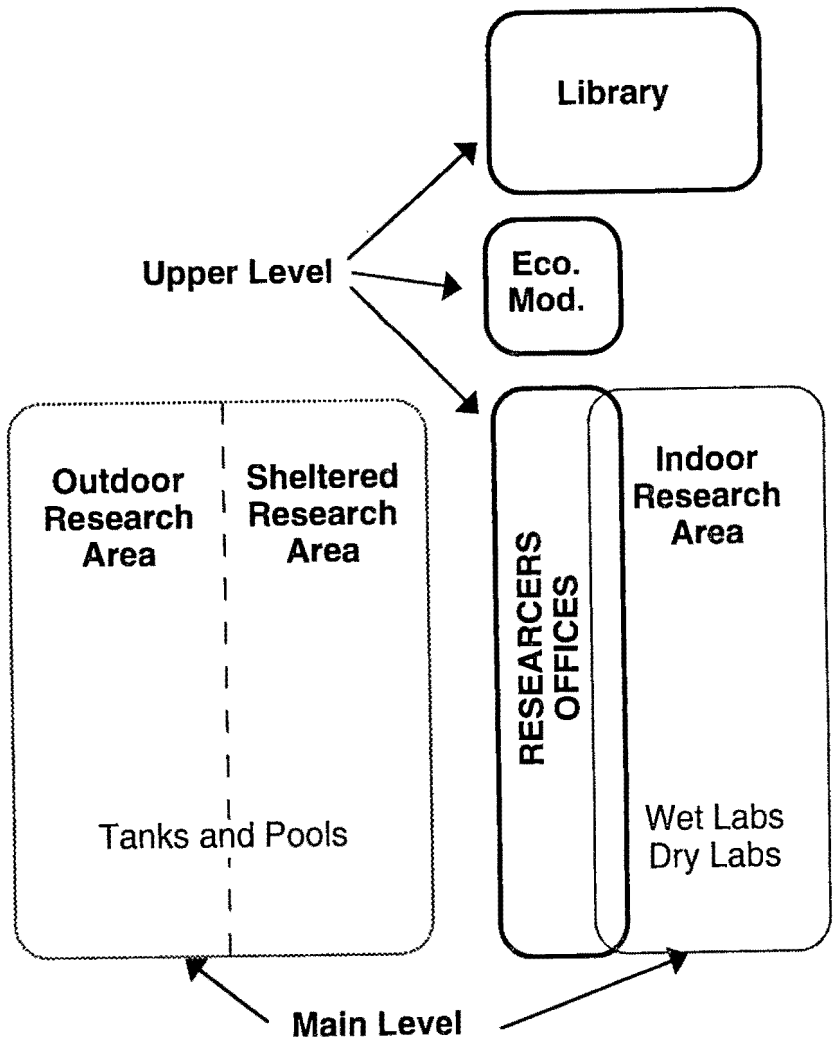
RESEARCH LAB CONCEPT



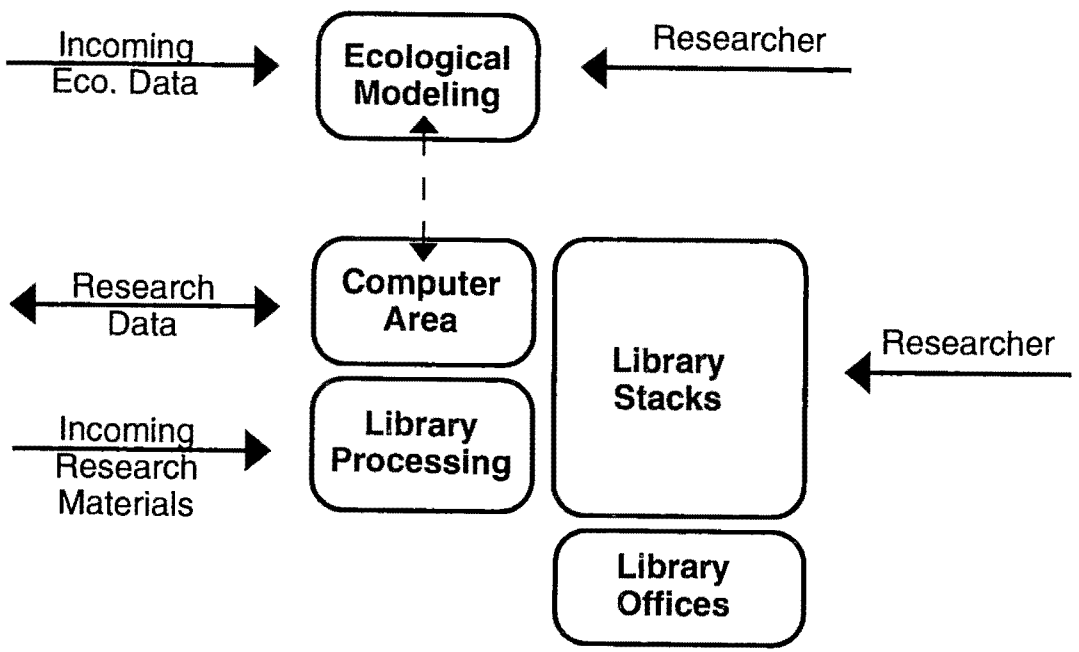
QUARANTINE CONCEPT



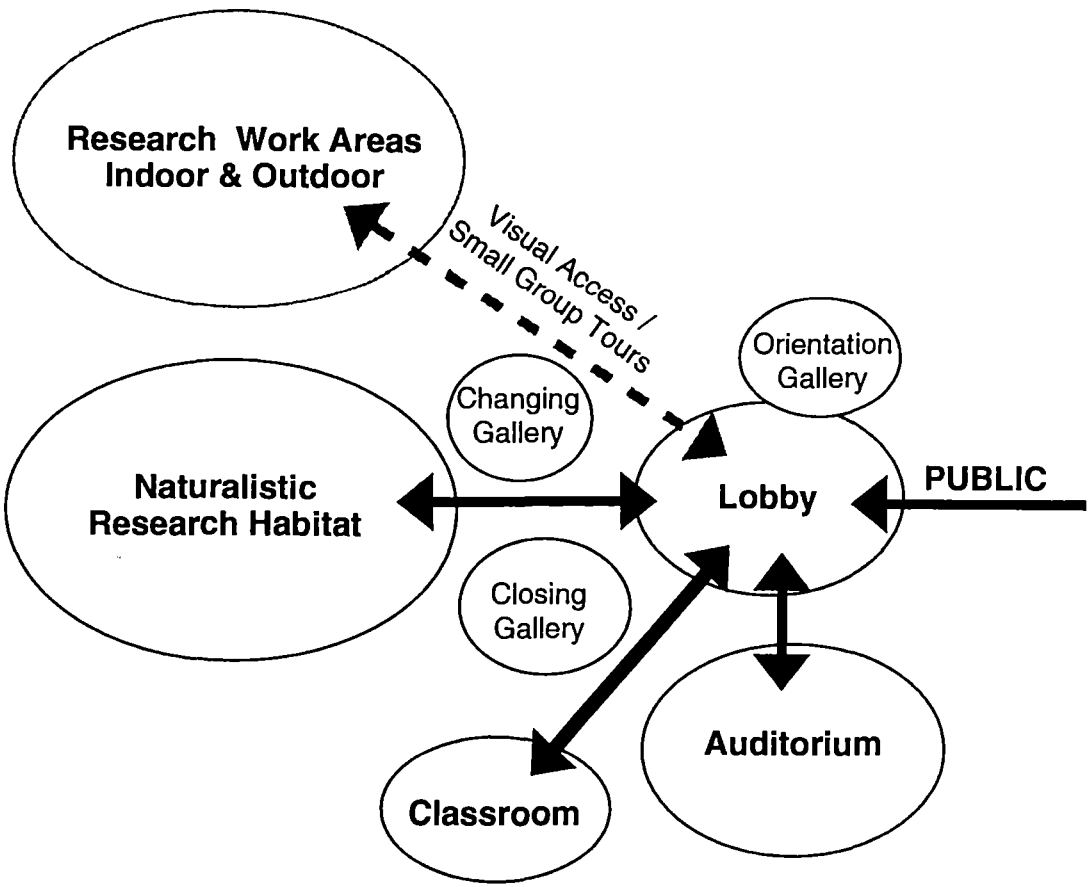
RESEARCH WORK AREAS CONCEPT



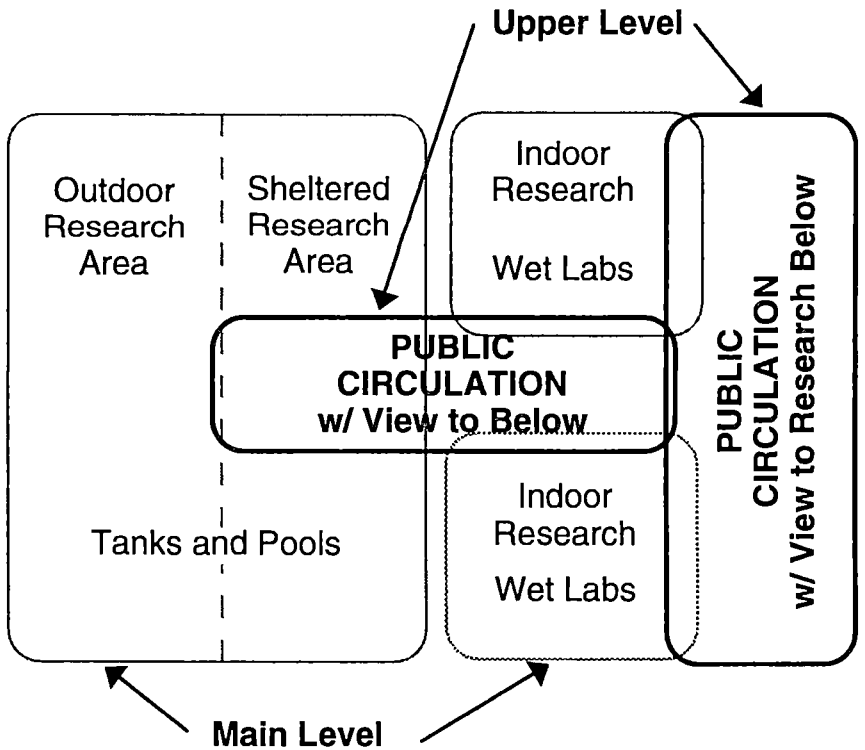
DATA REPOSITORY & LIBRARY



EDUCATION COMPONENT / PUBLIC AREAS



PUBLIC VIEWING OF RESEARCH COMPONENT



3.0 CONCEPTS

Notes and Comments

3.2 Site Concepts

A. DESTINATION POINT

As a destination point, the IMS Infrastructure Improvements/Alaska SeaLife Center would serve to balance the development at the northern end of the city by providing a visitor ***destination and focus for retail*** and commercial business development. It would cause an exchange of pedestrian and vehicular traffic between itself and those defined activities to the north. Visitors would be exchanged from the marina and cruise ship dock and the IMS Infrastructure Improvements through the city center and along the "esplanade" at the water's edge enhancing existing economic conditions and providing new economic opportunities. The proposed project would create a dramatic place of focus and identity for Seward's southern water's edge.

B. SITE DESIGN CONCEPTS

The essential concepts of the site design are to:

1. Preserve the ***view corridors*** to Resurrection Bay from the central business district by keeping the building back from those view corridors as they are formed by the existing streets and to maintain the existing height limitation of 34 feet above finish grade.

2. Maintain and enhance the public need for ***access to the shoreline*** for viewing the Bay and the surroundings, fishing and walking.

3. Provide a ***link*** to and from the new parking with potential continuation of the beachfront and future pedestrian waterfront esplanade.

4. Provide ***shoreline vegetation and development*** that is indicative of the characteristic rocky shoreline.

5. Provide for appropriate ***architectural and landscape transitions*** to a restored and reestablished gravel beachfront.

6. Develop an architectural solution that respects the existing architectural context of ***the City core***, particularly along the urban edge of Railway Avenue.

7. Provide an ***integrated physical and visual setting for*** the historic Ladies Park, the Depot and the Iditarod Commemorative Historic Trail.

C. LANDSCAPE CONCEPTS AND TREATMENTS: SITE DESIGN FEATURES

The plan calls for the development of four major landscape components that extend the major elements of the new building and the west edge of the outdoor research habitats. Those four components are the three part public space that occurs between the habitats and the parking lot, the parking lot itself, the existing city park and the shoreline running east from the existing dock.

The shoreline is seen to take place from the southern edge of the parking lot to the bay. This edge is to be restored to its original form as a sloping gravel beach trending back from the water with appropriate dune grasses and vegetation typical of the region. The western end nearest the existing dock will be rehabilitated by the construction of continuous wooden fishing piers over the existing sheet pile retaining wall. This edge will act as an improved extension of the existing pedestrian movement along the shoreline. The new vegetation will be respected by the development of paths.

The new parking lot will be paved and stripped, and will contain green islands, which will be planted with appropriate vegetation. These islands and similar vegetation and paths at the northern edge of the parking lot will provide a dramatically improved setting for the historic elements within the park.

The public space that will exist between the parking lot and the research habitats has three essential components. One will be a hard surface public place at the western end of the park and in front of the entrance to the educational component. This plaza forms an appropriate visual termination to the 4th Avenue urban corridor and introduces the transition to the waters edge. The plaza also provides an appropriate space for gathering and activities such as the start of the Mt. Marathon Race, the City Christmas Tree and other public events of Seward. The second element is the viewpoint location that will be formed at the existing dock itself. The third element is the link between these two points. This link will be formed by extensions and outcroppings of the rockwork of the habitat forms. It will also be planted with appropriate forest vegetation. These outcroppings and plantations will offer places of rest and protection from the elements. Like the habitat, the extensions and outcroppings will resemble the linear and folded glacial rock formations of the region.

Notes and Comments

Concepts

Use of Existing IMS Facilities

The proposed project will provide extended research facilities for the current and future efforts of the IMS faculty and scientists. In order to allow for the future growth, the actual IMS Infrastructure Improvements building will not be constructed on the property that is currently leased to the SMC by the City of Seward. It is intended that a small portion of the eastern portion of that lease, currently know as the "boneyard" will be used for outdoor, but sheltered research tanks and pools that will serve both the existing and new facilities.

IMS Rae Building

The Rae Building, in cooperation with the University of Alaska Fairbanks, is being investigated for potential reuse possibilities as part of this project.

D. TIDE POOL / WAVE BARRIER

Earlier versions of the project's design called for the construction of a wave barrier, which would protect it from wave damage from the 100 year storm. That wave barrier was configured as a mound of armor rock some 200 feet long with a base 100 feet wide, and a 40 foot wide cap some 17 feet above mean low lower water or zero feet on the topographic maps.

The current solution provides for wave impact mitigation and protection, but also provides for the future addition of a tide pool for future education and research projects. The tide pool would provide a unique educational and research opportunity for the study and observation of marine life that occurs in the region. The tide pool would be formed of sheet pile cells driven to within 2 to 3 feet above the mean low water line. Those cells would then be back filled, and armor rock piled on top to form the Bay side edge of the pool. The shore side of the pool would be formed in the same manner, but the sheet pile/armor rock assembly would begin at a higher elevation. The 2 to 3 foot sheet pile edge would have welded to it a continuous "basket" which would be filled with rocks. This rocky edge would provide habitat for marine fauna and flora and protection for prey species. The tide pool would be supplied with seawater effluent from the facility.

Notes and Comments

Concepts

NEEDS

Notes and Comments

Research and Rehabilitation Component

Area	Notes		Interior* Area (sf)	Exterior Area (sf)
Marine Mammals				
Research Habitat	Harbor Seal habitat			
	Stellar Sea Lion Habitat			
	Sea Otter Habitat			
		subtotal		8,000
Research Tanks / Pools / Pens				10,000
Research Work Area -Wet Lab			700	
Research Work Area - Dry Lab			400	
Mammal Quarantine	Quarantine / Treatment areas			
	Rehab Tanks / Pools / Pens			
	Food Pantry			
		subtotal	1,400	
Offices	Faculty Offices - 2 @ 125 sf ea.		250	
	Visiting Scientist Offices - 2 @ 100 sf ea.		200	
	Technician / Students Office		150	
Lab and Tissue Storage			200	
	Marine Mammal Subtotal		3,300	18,000

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Marine Birds			
Marine Bird Habitat			2,200
Research Tanks / Pools			2,000
Research Work Area-Wet Lab		400	
Research Work Area-Dry Lab		400	
Quarantine	Wet and Dry Holding		
	Treatment Area		
	Food Pantry	500	
Offices	Faculty Office	125	
	Visiting Scientist Office	100	
	Technician / Students Office	150	
Lab and Tissue Storage		200	
	Marine Bird Subtotal	1,875	4,200

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Fish & Invertebrates			
Outdoor Raceway / Tanks / Pools			2,000
Wet Laboratories			
	A. Large Lab	1,500	
	B. Shared Wet Lab	400	
Dry Labs	A. 2 labs for A. wet lab - @ 400 sf. ea	800	
Quarantine Lab		200	
Lab / Tissue Storage		450	
Offices	Faculty Offices - 2@ 125 sf ea.	250	
	Visiting Scientist Office	100	
	Fish Biologist Office	100	
	Technician / Students Office	150	
	Fish / Invertebrate Subtotal	3,950	2,000

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Monitoring and Research			
EVOS Restoration Library			
	Stacks	1,500	
	Library Office	125	
	Processing/Info Specialist	175	
	Storage	100	
	Computer Area	100	
Ecological Modeling Program			
	Office	125	
	Computer / Work Area	300	
	Monitoring and Research Subtotal	2,425	0
Oceanography			
Offices	Faculty Office	125	
	Visiting Scientist Office	100	
	Technician / Students Office	150	
	Oceanography Subtotal	375	0

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Notes and Comments

Area	Notes		Interior* Area (sf)	Exterior Area (sf)
Veterinary / Husbandry & Support Areas				
Central Dry Lab	Toxciology			
	Bacteriology			
	Centrifuge			
	Darkroom			
	Special Equipment			
	General Testing Lab			
		subtotal	1,800	
Clinic				
	Medical Treatment / Surgery		400	
	Medical Supplies / Storage		100	
	Necropsy Room		300	
Quarantine	(see marine mammals, birds, fish/inv above)			
Food Services	Food Preparation		200	
	Food Storage		400	
Offices / Work Areas				
	Veterinarian's Office		150	
	Animal Care Technicians (6)		300	
	Night Supervisors (3)		shared	
		Vet / Husbandry Subtotal	3,650	0

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Research Component Service Areas			
Staff Areas	Diving Locker Room / Equipment Storage	400	
	Laundry Room	150	
	Staff Breakroom	150	
	Staff Restroom	600	
	Staff Showers and Lockers	300	
Storage	Equipment / Supplies Storage	100	
	Support Areas subtotal	1,700	0
Research Component Subtotal		17,275	24,200
	Efficiency @ 80%	4,319	
Subtotal		21,594	24,200

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Notes and Comments

Education Component

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Exhibits			
Marine Mammals	Harbor Seal habitat		see research
	Stellar Sea Lion Habitat		see research
	Sea Otter Habitat		see research
Marine Birds	Marine Bird Exhibit		
Exhibits w/ Research Interpretation			
	Orientation Exhibit	2,000	
	Changing Exhibit	1,000	
	Closing Exhibit	2,000	
	(Exhibits / interpretive materials will also occur in circulation area listed below.)		
	Exhibits Subtotal	5,000	0

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Education / Outreach Programs			
Education Director		120	
Curators	Instructors / Educators	150	
Secretary		100	
Exhibit Development / Interpretation			
	Naturalists / Exhibit Designers	150	
	Work Area / Media Area	300	
Outreach Curriculum Development Office		200	
Volunteer Coordinator		100	
Classrooms	Classroom	500	
	Education / Outreach Subtotal	1,620	0
Education Component Subtotal		6,620	0
	Circulation	12,500	
Subtotal		19,120	

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Notes and Comments

Facility Support Requirements

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Administrative Areas			
Administrative Offices	Executive Director	150	
	Executive Secretary	100	
	Finance Director	125	
	Administrative Assistant	100	
	Marketing Director	125	
	Membership Coordinator	125	
	Accounting Assistant	100	
	Program Director	125	
	Administrative Assistant	100	
	Research Director	125	
	Administrative Assistant	100	
Conference Room	20 people @ 15 sf ea.	300	
Administrative Storage			
	Records / Files Storage	75	
	Office Supplies / Marketing Supplies	75	
Staff Areas			
	Staff Break Room	250	
	Staff Restrooms	600	
	Admin. Subtotal	2,575	0

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Lobby and Public Areas			
Entry	Public Entry	100	
	Groups & Members	100	
Lobby		2,400	
Ticketing		100	
Information		100	
Giftshop / Bookstore	Shop Area	2,500	
	Storage	1,000	
	Cashiers	100	
	Giftshop Manager	0	
	Giftshop assistants		
Auditorium	200 people @ 12 sf. ea	2,400	
Coat Room		150	
Restrooms		600	
Storage	Wheelchairs / Carriage, signage, etc.	50	
	Lobby & Public Service Subtotal	9,600	0
Life Support			
Life Support		7,500	
	Life Support Subtotal	7,500	0

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)
Building Security and Maintenance			
Security / Receiving Office		100	
Custodial	Custodial Office	100	
	Janitor Areas	150	
	Storage	250	
Workshop		300	
Physical Plant / Maintenance			
	Physical Plant manager	125	
	Assistant Plant manager	100	
	Central Control Room	150	
	Mechanical / Electrical Room(s)	5,000	
Building Storage	Equipment / Misc. Storage	200	
	Grounds Storage	200	
	Bldg. Security / Maintenance Subtotal	6,675	0
Building Services			
Loading Dock / Receiving Area / Holding		400	
Trash Storage		200	
	Bldg. Services Subtotal	600	0
Facility Support Subtotal		26,950	0
	Efficiency @ 80%	6,738	
Subtotal		33,688	0

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Notes and Comments

Area	Notes	Interior* Area (sf)	Exterior Area (sf)

Totals	Interior	Exterior	Total
Research and Rehabilitation Component	21,594	24,200	45,794
Education Component	19,120	0	19,120
Facility Support	33,688	0	33,688
	74,401	24,200	

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BIBLIOGRAPHY

SOURCES

1. *Institute of Marine Science, Required Infrastructure Improvements*, Presentation to Exxon Valdez Oil Spill Trustees Council, January 31, 1994.
2. *USDA, Animal and Plant Inspection Services 9 CFR CH 1.* (1-1-93 Edition) pp. 90-108.
3. *Architecture, September 1992, Age of Aquariums.*
4. *The Sierra Club Handbook of Seal and Sirenians*, Reeves, Steward and Leatherwood, San Francisco, 1992.
5. *National Oceanic and Atmospheric Administration*, National Marine Fisheries Service, Juneau, Alaska.
6. *Institute of Marine Sciences*, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks.
7. *Education Work Group*, IMS Infrastructure Improvements / Alaska Sealife Center Education Work Group Workshop, April 13, 14, 1994.
8. *Scientific Work Group*, IMS Infrastructure Improvements / Alaska Sealife Center Scientific Work Group Workshop, April 11, 12, 1994.
9. *A New Place for Learning Science*, Sheila Grinnell, Association of Science and Technology Centers, Aztec, Washington DC, 1992.
10. *Greater Anchorage Area Borough School District*, Science Curriculum and Evaluation Office, Donna York.
11. *Kenai Peninsula Borough School District,* Paul Epperson.
12. *Chris Parsons*, Word Craft, Monterey California.
13. *Feasibility Study for the Alaska Sealife Center*, Thomas J. Martin, August, 1993.
14. *Alaska Sealife Center, Resident / Non-resident Market Demand Study*, Fox Practical Marketing and Management, July, 1993.
15. *Alaska Sealife Center Master Plan*, Cambridge Seven Associates, March, 1994.
16. *Proposed Operating Characteristics - Draft*, IMS Infrastructure Improvements Project, Heery International, April, 1994.
17. *Public Financial Management*, Independent Evaluation of Fox Study conducted for AIDEA.
18. Dr. Joyce Murphy, DVM.
19. Serrell, Beverly, "Whats the Big Idea?" Exhibition, Winter 1994.
20. Sundberg, Kim, "Purpose Need and Budget for the Institute of Marine Science Improvements", DRAFT June 29, 1994.

RESOURCES

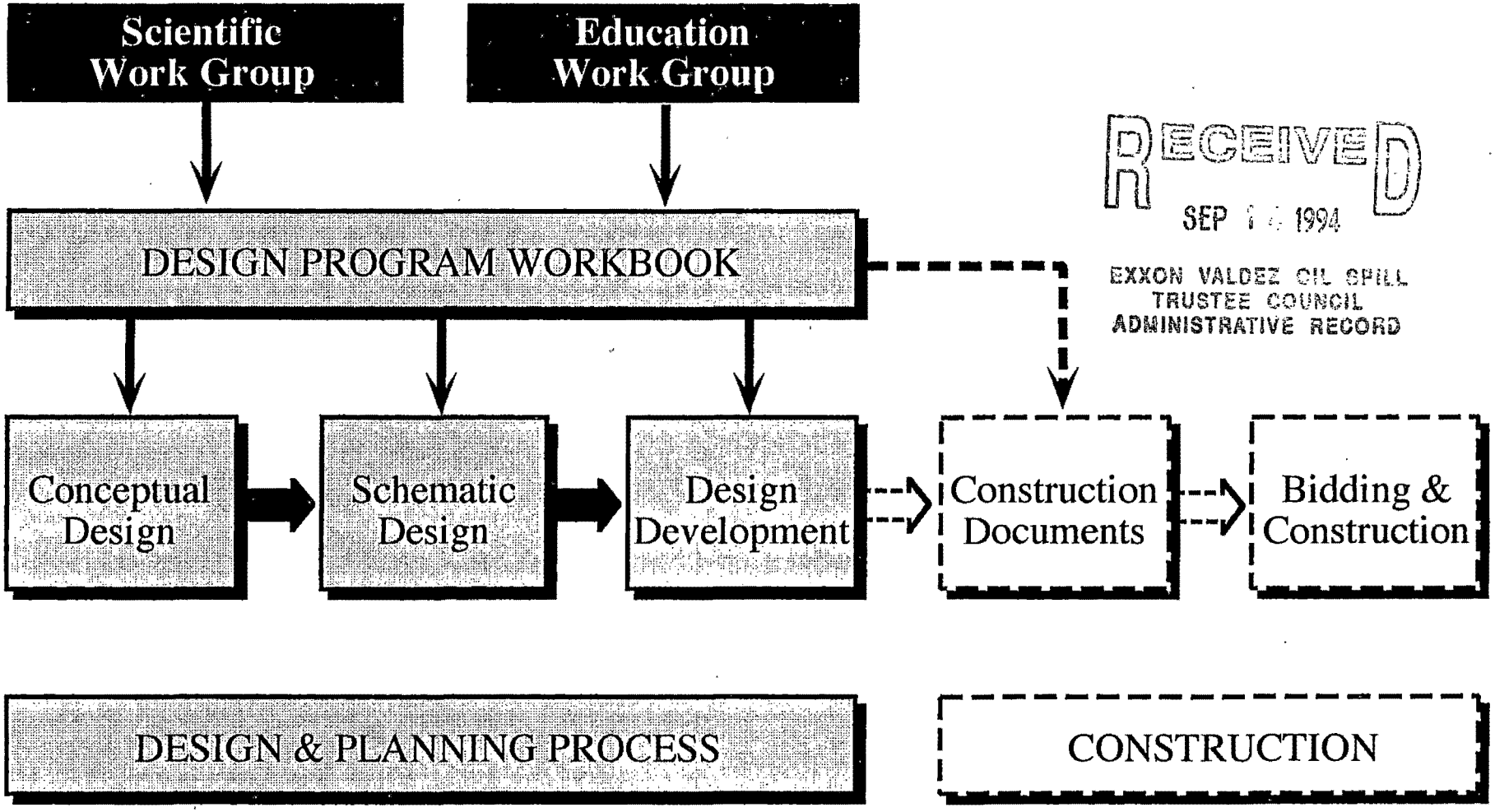
In addition to the previously listed **Sources** of information for this draft of the Design Program, the following **Resources** have been identified for gathering information in the future. This is a preliminary list. It will develop as the Design Program develops.

1. Sea Grant Sea Week Program for grades K-6, Alaska Sea Grant Program, University of Alaska Fairbanks.

2. Alaska Natural Resource Organization (ANRO) Cathy Rezabeck, Pres., PO Box 110536, Anchorage, AK 99511-0536.

3. National Association of Marine Educators - Alaska, Jan Wallace Peck, 36095, Iron Ave., Soldotna, AK 99669, (907) 262-5098.

4. Alaska Science Teachers Association (ASTA), Terry Slaven, Pres., PO Box 871123, Wasilla, AK, 99687.



IMS Infrastructure Improvements
Project #94199
Draft September 9, 1994

Work Groups Interface
with Programming, Design
and Construction Process

18.1.5D

DRAFT September 14, 1994

Purpose and Need

The purpose of the improvements affiliated with the University of Alaska Fairbanks (UAF), Institute of Marine Science (IMS) at Seward is to provide needed infrastructure for conducting the long-term research and monitoring program required to restore and enhance resources injured by the *Exxon Valdez* oil spill (EVOS). This institute would conduct research and monitoring studies on injured resources and the ecosystem with specialized capabilities for studies on marine mammals, marine birds and fish genetics. Other research capabilities at the institute would include marine fish and invertebrate studies, oceanography, and a library. In carrying out EVOS research objectives, scientists working at the facility including those with the UAF and Alaska Department of Fish and Game (ADF&G) would collaborate with other agency, academic and private scientists including those with the National Biological Survey (NBS), U.S. Fish and Wildlife Service (USFWS), and National Oceanographic and Atmospheric Administration (NOAA) and other research institutes including the Prince William Sound Science Center, Copper River Delta Institute, Fisheries Industrial and Technology Center and Auke Bay Laboratories. This facility would be available to interface with and enhance other EVOS research and monitoring work by offering marine research capabilities that do not currently exist in the region.

Because of the proposed institute's:

- Close proximity to injured marine mammal, bird, fish and invertebrate resources
- Availability of high quality running seawater and freshwater for carrying out animal research and rehabilitation programs
- Opportunity to become operationally self-supporting with revenue derived from public visitation and education
- Affiliation with the University of Alaska, School of Fisheries and Ocean Science and Institute of Marine Science

this project provides a unique opportunity for carrying out long-term research goals with respect to understanding and potentially influencing factors affecting the recovery of marine mammal, marine bird, and other injured resources.

The research and rehabilitation programs to be carried out at the proposed facility would, among other things, endeavor to restore, to their pre-spill condition, those species injured by the oil spill. Species of recovering resources including: Harbor seal, Sea otter, Common murre, Harlequin duck, Marbled murrelet, Pigeon guillemot, Herring, and Pink salmon. Studies conducted at the institute would support the primary restoration strategies for these species as outlined in the *Draft Restoration Plan*:

- Conduct research to find out why these resources are not recovering
- Initiate, sustain, or accelerate recovery
- Monitor recovery

Additionally, research made possible by the IMS improvements would enhance the long-term research and monitoring program being implemented for the EVOS area. For example, laboratory studies on heritable injuries to pink salmon and potentially herring resulting from sublethal genetic damage would benefit from close proximity to oiled anadromous streams and beaches and the affected stocks of pink salmon and herring. Additionally, the availability of this facility would provide opportunities to perform studies on other fish and shellfish documented or suspected of being injured by EVOS that cannot presently be conducted at existing facilities. Similarly, research and monitoring efforts on injured marine mammals and marine birds would benefit from opportunities to utilize mammals and birds from the spill area in laboratory studies as well as having a center for supporting field studies.

The need for the IMS improvements to augment EVOS restoration efforts is illustrated by the following excerpts from the Research Strategies in the May 16, 1994 Invitation to Submit Restoration Projects for Fiscal Year 1995:

- *Five years after the oil spill, some resources are not recovering, while others are recovering only slowly. For these resources, restoration requires an understanding of the factors constraining recovery: Why aren't these resources recovering? If they are recovering only slowly, why? Without answers to these questions, restoration efforts may be ineffective.*
- *The ecosystem approach will require multi-disciplinary, long-term research on ecosystem processes that may be limiting recovery, in addition to resource-specific research projects.*
- *Because ecosystem processes are complex and may involve multiple resources, restoration projects to address these questions involve an integrated, collaborative, multi-disciplinary approach.*

Relationship to Other Coastal Research Facilities

Coastal research facilities conducting work in the EVOS area are summarized on pages XX - XX. **It is not the intent of the proposed facility to conduct nor direct all research and monitoring in the EVOS area.** However, the facility is anticipated to become a center for conducting research on marine mammals, marine birds, and fish genetics in the EVOS area.

To date, Natural Resource Damage Assessment (NRDA) and subsequent restoration research and monitoring efforts have been largely field based. The reasons for this are numerous and include the following factors to various degrees: 1) the paucity of adequate laboratory facilities in the EVOS area has restricted the use of laboratory-based approaches for many studies, 2) NRDA studies and subsequent "restoration studies" were primarily designed as field experiments to measure *in situ* effects of the oil spill, 3) the research and management budgets of resource (Trustee) agencies in Alaska have historically focused on field techniques to derive estimates of fish and wildlife populations, and 4) Alaska's fish and wildlife resources are monitored and managed by multiple Federal and state agencies (USFWS, NBS, NMFS, NPS, USFS, ADF&G) which has resulted in fragmented funding for research facilities.

Relationship to SEA Plan and Other Ecosystem Studies

Recently, the Prince William Sound Science Center has initiated the Sound Ecosystem Assessment (SEA) program to better understand the effects of human-caused and naturally occurring disturbances on the Prince William Sound ecosystem. Development of this program was partially driven by the need to understand the causes of unexpectedly low returns of wild and hatchery pink salmon in 1991, 1992, and 1993; and also, the failure of Pacific herring stocks in 1993 and 1994. The SEA program involves cooperative work among researchers from ADF&G, UAF, NBS, the Copper River Delta Institute, and the Prince William Sound Aquaculture Corporation; and is intended to be along-term program with data collection for, at least, seven to ten years.

In FY95, work is anticipated to begin on Marine Mammal Ecosystem Studies (initially emphasizing factors affecting recovery of harbor seals), Forage Fish Investigations (investigating whether the forage fish prey base is constraining recovery of injured resources including: common murre, harbor seal, harlequin duck, marbled murrelet, and salmon), and Stable Isotope Analyses (using tracers to describe food sources and prey dependencies among marine mammals, seabirds and fish in Prince William Sound. Although it is not possible at this time to precisely predict how these studies would be structured in FY 97 when the facility is scheduled to open, it is anticipated that portions of these studies dealing with marine mammals, marine birds, and fish genetics would be carried out through UAF, ADF&G, and other researchers working at the proposed facility.

Despite the efforts of many capable marine scientists and the expenditure of nearly a hundred million dollars on NRDA studies in the EVOS region, scientists and managers are currently unable to understand significant changes occurring in the northern Gulf of Alaska and Prince William Sound ecosystem as manifested by long term declines of pinnipeds (i.e., Steller sea lion, harbor seal) and pelagic seabirds (e.g., marbled murrelet, pigeon guillemot, black-legged kittiwake) and recent catastrophic failures of pink salmon and herring stocks in Prince William Sound. The proposed IMS improvements would provide a facility to

focus on several key areas of marine research, notably marine mammals, marine birds, and fish genetics. Additionally, the facility would enhance the efforts of other research disciplines including oceanography and marine ecology that would provide additional opportunities for restoration of injured resources.

Scientific Work Group

The IMS Scientific Work Group (SWG) was formed in March, 1994 to define the research and rehabilitation functions of the proposed facility and to guide the design program for the project architects. The SWG is comprised of representatives of UAF, NBS, NOAA, and ADF&G and has included the assistance of Dr. Joseph R. Geraci, a consulting marine mammal specialist and Mr. W. Scott Drieschman, a consulting seabird specialist, as well as the Trustee Council Chief Scientist and Trustee Council agency liaisons. The SWG in conjunction with a corollary group, the Education Work Group (EWG) has produced the Design Program Workbook. This document is further described in the Programming Process section. The Design Program Workbook has incorporated new information as the SWG, the EWG and the project team continue to review assumptions and bring the project forward.

Anticipated Research Program

The proposed IMS improvements would provide needed laboratory facilities to focus the research and monitoring needs for marine mammals (primarily pinnipeds and sea otters) and marine birds (primarily pelagic seabirds) in the EVOS area. Additionally, wet and dry laboratories would be furnished for fish genetics research associated with EVOS-induced heritable genetic damage in salmonids and potentially herring; and for live studies of bioenergetics, reproduction, neurobiology and disease associated with fish and invertebrates in the EVOS region. There are no existing facilities in Alaska that can presently address these needs. Additionally, research on oceanography and ecological modeling are anticipated at the facility. The facility would also house a specialized library with a repository of literature and other information relating to research in the northern Gulf of Alaska and EVOS region. This library would become part of the integrated information management system for EVOS restoration efforts. Research would be carried out at the facility by the UAF; ADF&G; and other Trustee Agencies including the NBS and USFWS. Additionally, it is anticipated that visiting scientists affiliated with agency, academic, and private institutes would use the facility.

The following is a description of anticipated research activities and programs that would be carried out at the proposed facility as envisioned by the SWG. Based on information gathered to date, in consultation with the Chief Scientist, we anticipate that the following long term research needs exist:

Marine Mammals

Harbor seal: The EVOS caused population declines and sublethal injuries to harbor seals in Prince William Sound. While some dead seals were recovered from the Kenai Peninsula, the extent of injury outside of Prince William Sound is unknown. Because harbor seal populations in northern Gulf of Alaska have declined precipitously since 1984, and the underlying causes of this decline are unknown, it is difficult to predict recovery from the oil spill. A better understanding of the causes of the decline will be required to determine the actions needed for recovery.

Steller sea lion: Results from sea lion studies have been inconclusive concerning the effects of the EVOS. Steller sea lion populations have experienced a severe decline (up to 93%) over the last 30 years in the northern Gulf of Alaska. They are currently listed as Threatened under the Endangered Species Act. No estimate of recovery time is available. As with harbor seals, a better understanding of the causes of the decline will be required to determine the actions needed for recovery.

Sea otter: The EVOS caused declines in populations of sea otters in Prince William Sound and possibly the Gulf of Alaska. Sea otters were the most abundant marine animal in the path of the oil and were particularly vulnerable to its effects. While little or no evidence of recovery has been detected thus far, sea otters are expected to eventually recover to their prespill population, perhaps in several decades. However, future rates of population increase are difficult to estimate.

Marine mammal research program overview: The marine mammal program would be extremely diverse and probably the largest user of the facility in terms of space and personnel. Projects would include: captive feeding/energetics, hydrodynamics, development and testing of telemetry equipment, testing of immobilizing drugs, health status and disease studies, reproduction biology, physiology, behavior, and ecosystem modeling and data management. This program would interact with the veterinarian and rehabilitation projects at the facility as well as operate a field program, in coordination with other field studies in the EVOS region. Anticipated full-time research personnel include two to three dedicated UAF faculty, three to four dedicated students, two to three technicians/research faculty, and one to three visiting researchers (ADF&G, other agencies, academic, private). Present collaboration between the University of Alaska IMS and ADF&G on EVOS marine mammal projects is reflected in at least two Category 1 proposals (#95001 & #95117BAA) dealing with harbor seals in the FY 95 Work Plan. Anticipated future work involving UAF and ADF&G personnel that is relevant to use of the proposed facility is described below. The projects require, among other things, specialized research tanks, animal holding and quarantine areas, research habitat with underwater viewing, wet labs with running sea water, dry labs, animal food preparation area, surgery and pharmacy, necropsy room, freezers,

offices, library, and computer services. The following is a brief description of specific projects that are anticipated to be undertaken at the institute:

Health/Disease Status: Harbor Seals, Steller sea lions, and sea otters would be tested for a wide variety of specific blood indices of health and how these factors change over time with various handling regimes. This would provide opportunities to identify problems which may be preventing recovery. Veterinary panels of blood chemistry and research level analyses of stress proteins and hormone status would be used to assess health. Animals from captive situations would be compared to wild animals and historic samples would be taken from inside and outside of the EVOS region. This work involves routine blood sampling of captive and wild animals.

There is a great amount of information on health and disease that can be gathered from the live and dead animals that would be handled at the institute. To assist in the recovery of injured resources, ADF&G seal and sea lion projects would be able to obtain sample data from all available animals to compare with and help interpret results of field research being done on wild animals. This information would be used to produce a database on the clinical characteristics of sick and healthy Alaska pinnipeds. In the future, it will be possible to conduct experiments on exposures to disease and testing of vaccines for purposes of providing for the recovery of injured species.

Body Condition: Morphometric examinations of animals over time and development are used to model body condition (length, girth, mass relationships). These data are used to understand how an animal's mass and size can be used to determine health condition relative to fatness or malnutrition. These data also apply to studies on energetics through hydrodynamic relationships. Animals in captive conditions are used to compare and model data obtained from wild animals. This would provide opportunities to determine how recovery of injured species is linked to diet.

Energy assimilation: Feeding studies would be undertaken to look at the relationships between types and quantities of food and whole body energy demands of animals. Carefully controlled studies of metabolic rates, digestion efficiency, body temperature fluctuations, and feeding rates would be conducted. These data would be used, in conjunction with field studies, to test *Limitation of Food* hypotheses on recovery of injured species.

Hydrodynamics and diving physiology: While at sea, marine mammals spend a great deal of time swimming and diving underwater. Estimates on the energetic costs to marine mammals while they are at sea are obtained by modeling hydrodynamic constraints on animals in controlled situations. Estimates of how much energy an animal utilizes require studies on the control of body function, metabolic rate, thermoregulation, and breath-holding. These studies would be carried out in research tanks utilizing a suite of physical measurements, a swimmill, and computer modeling. Research of this type provides

opportunities to determine how energetic costs are affecting the survival of adult and juvenile harbor seals, sea otters, and other injured species.

Development and testing of telemetry equipment: Satellite linked transmitters are being used to gather data on the distribution and behavior of injured resources including harbor seals and sea lions both on land and at sea. A variety of sensors are available to take various physiological (dive duration, speed, internal temperature, heart rate) and environmental (depth, water temperature, video, light and sound levels) measurements. Different attachment techniques are used for various instrument packages. The best way to test the sensors and attachment techniques is on captive animals of the appropriate species and sizes. This would be done in the large naturalistic habitat tanks where test animals have access to haulouts, diving areas, and other animals. The behavior of test animals and the instrument package would be monitored to determine effects. These studies would lead to more informative and reliable telemetry studies which are used to monitor recovery and determine factors limiting recovery of injured species.

Testing of immobilizing drugs: The use of immobilizing drugs is essential to carrying out research and monitoring studies of injured marine mammals. There are some problems with the drugs currently available for immobilizing Steller sea lions. Testing of new drugs and development of immobilization protocols can best be done with captive animals. Immobilization studies would be done on animals in small research tanks under the supervision of a veterinarian with a full suite of physiological monitoring equipment. These studies would likely lead to improved capabilities for field scientists to collect blood and tissue samples and attach instrument packages to animals while reducing side effects and mortality to wild animals.

Stable isotope fractionation: A series of studies are anticipated that would investigate the effects of diet type and physiology on the fractionation of stable isotopes in marine mammals. Diets of known composition would be fed to captive harbor seals and other pinnipeds to follow the incorporation of stable isotopes in keratinous tissues such as whiskers and claws. A determination of the fidelity of isotope ratio transfers would provide essential data for understanding food web interactions in wild populations. By adding trace amounts of labeled substrates to diets, the quality and assimilation efficiencies of food sources can be estimated. Hydrolysis and isolation of individual amino acids in whiskers and blood would enable the identification of essential amino acids in pinnipeds and the extent of transamination effects in altering nitrogen isotope ratios. This information would also assist in assessing the dietary quality of prey species in the trophic energetics of marine mammals.

Marine Birds

Murres: The oil spill caused population declines and sublethal injuries at murre colonies in the Gulf of Alaska. In general it is estimated that between 35% to 70% of the breeding adults at the Chiswell Islands, Barren Islands, Puale Bay, and the Triplets were killed by the EVOS. The degree of recovery necessarily varies among the affected colonies. There are preliminary indications of recovery at the Barren Islands but it is not yet known when the timing of reproduction will return to normal. Agency scientists estimate it could take many decades and perhaps a century before the injured murre populations return to their prespill levels. Variables affecting recovery time include the amount of disturbance near colonies and the rate of migration from healthy colonies.

Marbled murrelet: The EVOS caused an estimated 5-10% decline in the marbled murrelet population in the spill area. Marbled murrelets were thought to be declining Prince William Sound and the Gulf of Alaska prior to the oil spill. Although there is uncertainty associated with the decline, scientists expect it to continue. There are several factors that could account for this decline including a diminished food supply, increased predation, reduced nesting habitat, or fishery interactions, but there are no conclusive data indicating if any or all of these factors are affecting the population.

Pigeon guillemot: The EVOS caused up to an estimated 15% decline in the population of pigeon guillemots in the Gulf of Alaska. Pigeon guillemots were thought to be declining in Prince William Sound prior to the spill. The reasons for the long-term decline are unknown which makes predictions about future population trends and the prospects for recovery extremely difficult.

Harlequin duck: The EVOS caused population declines and appears to have caused sublethal injuries to harlequin ducks. An estimated 1,000 harlequin ducks were killed by the spill. Residual oil in the environment and in their preferred prey, is thought to affecting their reproduction and subsequent recovery. However, there is little known about how oil may affect reproduction and what physiological changes can be induced by feeding on oiled prey. Scientists disagree on the time it will take harlequin ducks to recover to their pre-spill levels, but estimates suggest that recovery may not occur for several decades.

Other marine birds: Numerous other birds were affected by the EVOS. Some of the other species found dead include ducks, gulls, terns, auklets, puffins, loons, grebes, shearwaters, petrels, cormorants, kittiwakes, and geese. There is a great deal of uncertainty about the recovery of populations of individual species because many were not studied during the NRDA process.

Marine bird research program overview: The marine bird program would conduct a wide range of projects including captive feeding/energetics, health status and disease studies, reproduction biology, physiology, behavior, development and testing of telemetry equipment, and ecosystem modeling. This program would interact with the veterinarian and

rehabilitation projects as well as operate a field program, in coordination with other field studies in the EVOS region. Anticipated full-time research personnel include one to two dedicated UAF faculty, one to two dedicated students, one to three technicians/research faculty, and one to three visiting researchers (agencies, academic, private). The projects require, among other things, use of specialized research tanks and pens, animal holding and quarantine areas, wet labs, dry labs, and the research habitat. The marine bird program would share the following facilities with the marine mammal program: animal food preparation areas, surgery and pharmacy, necropsy room, freezers, offices, library, and computer services. The following is a brief description of specific projects that are anticipated to be undertaken at the institute:

Health/Disease Status: NBS collects bird and mammal carcasses and conducts necropsies to obtain biological information. Presently these are frozen and returned to Anchorage for evaluation by the NBS veterinarian. There are minimal abilities to examine seriously ill specimens prior to mortality because of distance limitations. This results in higher mortality and some loss of data which could be used to determine the health/disease status of individual birds. The proposed institute would facilitate examination and tissue removal on sick or dead birds instead of transporting them to Anchorage. Examination of sick birds would also be useful for obtaining the physiological data needed to interpret disease processes. This would provide opportunities to identify problems which may be preventing recovery of injured resources.

Bird behavior: Behavioral studies would be undertaken in the research habitat and tanks to examine diving and food selection/handling characteristics. This information would improve our understanding of prey selection and food web interactions in wild populations which is needed to understand factors affecting recovery of injured species.

Bird physiology: Animals of known age, health condition, and dietary input kept at the facility would be examined to compare to physiological and biological data routinely collected in the field. This would provide a reference for interpreting information obtained from wild bird populations and would provide opportunities for determining how recovery is related to diet and overall fitness.

Development and testing of telemetry equipment: NBS and others employ telemetry techniques routinely to examine movements of birds and fish. The tanks and research habitat at the facility would be used to develop and test units prior to implant. Additionally, studies would examine the impact of new instruments on the natural behavior of target species. Such testing would improve the design of units to collect data that more reflects natural behavior before they are used in field studies on wild animals. These studies would lead to more informative and reliable telemetry studies which are used to monitor recovery and determine factors limiting recovery of injured species.

Stable isotope fractionation by seabirds: The incorporation of distinctive isotope ratios by feeding seabirds depends upon the isotope ratios in the prey being consumed and the rate of turnover of body tissues. It is well known that seabirds undergo pronounced seasonal variation in energy storage and mobilization in response to migrational and breeding activities. These activities may cause major shifts in energy resources and concomitant changes in isotope ratios due to physiological processes such as lipid synthesis/catabolism or transamination during protein synthesis associated with molting. Through the use of diets of known isotopic composition and the sampling of feathers during regrowth, it is expected that one could determine the efficiency of food assimilation and the extent of carbon and nitrogen isotope fractionation during tissue synthesis. As various species of seabirds become available, work would be extended to interspecific comparisons. Intraspecific variation of isotopic fractionation will also be tested when multiple individuals of a species are fed known diets under controlled conditions.

Fish/Invertebrates

Pink salmon: The EVOS caused sublethal injuries to wild populations of pink salmon, but there is some uncertainty about the extent of effects on population levels. Extremely low returns of hatchery-produced and wild fish to Prince William Sound in 1993 have focused attention on this issue. There is evidence that exposure to oil caused genetic damage in pink salmon and potentially herring. The genetic damage may be causing reduced size or reproductive success. This is a very critical area of research for pink salmon.

Intertidal and subtidal communities: The EVOS caused population declines and sublethal injuries to the community of plants and animals living in the intertidal and subtidal zones. Direct oiling and beach cleaning killed many organisms. Cleaning removed much of the oil from the intertidal zone but subsurface oil persisted in many heavily oiled beaches, and in mussel beds, which were avoided during cleanup. Moreover, cleaning transported oil contaminated sediments to the subtidal zone The lower and middle intertidal zones have recovered to a large extent; full recovery of the intertidal community, especially the upper intertidal zone may take more than a decade. Recovery of subtidal organisms is expected in most cases in several years.

Fish/Invertebrate research program overview: The proposed improvements would expand the capabilities of UAF and other fish and invertebrate restoration and monitoring studies to make use of marine laboratory facilities in the EVOS area. At present, non-EVOS studies are currently occupying all available laboratory space at the SMC. Additionally, a fish genetics program to examine heritable genetic damage to pink salmon, sockeye salmon, and potentially herring would be conducted by ADF&G. Currently, facilities for conducting fish genetics research on spill related injuries are very scarce and current projects are being hampered by water and disease problems and logistical difficulties with conducting studies at multiple locations including Anchorage and Southeast Alaska. The proposed facility

would be located near the source of the injured resources and would provide the critical capability to raise individual fish from eggs to maturity (freshwater through saltwater life stages), thereby allowing the analysis of gonads and gametes, along with progeny from oil exposed adults, for evidence of heritable genetic damage. Projects would include: laboratory exposure of salmonid eggs, embryos and larvae to varying concentrations of crude oil and its water soluble components to determine genetic effects; analysis of tissues from oil exposed fish for evidence of genetic damage; analysis of gonads, gametes and progeny of oil exposed adult fish for genetic damage; and laboratory and *in situ* studies of oil pollution effects on fish and invertebrate populations, food web interactions, and health. Field studies of residual oil pollution effects would be supplemented with live studies of bioenergetics, reproduction, neurobiology, and disease.

Additional spill related genetics projects that would likely utilize the facility include inheritance studies using all salmon species to confirm the genetic origins of allozyme polymorphisms; population genetics of pink salmon in Prince William Sound, and genetic marking of hatchery pink salmon in Prince William Sound.

These projects require, among other things, wet laboratories with high quality running seawater and freshwater, tanks, incubators, raceways, dry labs, freezers, offices, library, and computer services. Anticipated full time research personnel include: six to eight fishery biologists, four to six technicians/research faculty, and one to three visiting research scientists.

Oceanography

Recovery of injured resources may be related to physical conditions in the marine environment and lower trophic level functions including primary and secondary productivity. A comprehensive ecosystem approach for restoration would require establishing an oceanographic monitoring program for the EVOS area. The proposed improvements would expand the existing IMS oceanographic program at the SMC to allow for long term, year round evaluations of oceanographic features of the EVOS region including temperature, salinity, and nutrients. This program would improve the understanding of food web relationships and species interactions within the physical environment of the EVOS area. Monitoring would include phytoplankton and zooplankton, and intertidal and subtidal community profiles. As envisioned, the oceanographic baseline from Seward to Middleton Island would be expanded to include a series of stations from Prince William Sound to the Barren Islands. A dedicated oceanographic vessel for the EVOS area could make use of the existing dock and service facilities at the SMC when the *R/V Alpha Helix* is at sea. The program would use office space, library, and data management services at the proposed facility.

Data Management

The data management function would support many of the data processing and computer service needs of the marine mammal, marine bird, fish/invertebrate, and oceanographic programs. This program would assist researchers in organizing and processing information and would compliment the ecological modelling effort in the EVOS area. The proposed improvements would provide computer and office space for one full-time UAF research faculty and one to two students involved in this program.

Library

The library would support the research activities at the institute; and through a public interface and data links with other libraries it would provide an important component of an integrated restoration information program. The library would develop and maintain a specialized collection of information pertaining to marine research in the Northern Gulf of Alaska. This would include both published and unpublished reports associated with EVOS, University, agency, and private studies, maps, and databases. Through an information specialist, the library program would engage in synthesizing and making information available to researchers and the public. This would occur through special projects, symposia, newsletters, and bulletins. The proposed library is not envisioned as a full-service public library because this need can be met through other existing libraries. However, researchers and the public would have full access to library materials through an on-line catalog, interactive computer programs, interlibrary loans, and limited lending services.

Wildlife Rehabilitation Program

Among other things, the facility would provide for the rehabilitation and study of marine mammals and marine birds, particularly pinnipeds (harbor seal and Steller sea lion), sea otters, and seabirds (common murre, pigeon guillemot, marbled murrelet). The function would be integrated with the research being carried out at the facility to gain an improved understanding of factors affecting animal health recovery of injured resources. The facility would include tanks and pens (temporary holding, long term habitat, and quarantine), life support system (running sea water and disinfection), food preparation, pathology and water quality laboratory, x-ray, surgery, pharmacy, and necropsy. Presently, there are no facilities in Alaska with these capabilities.

As a regional "stranding center" the institute would have trained staff and resources to respond to incidences involving sick, injured, or dead marine mammals and marine birds in the northern Gulf of Alaska. Based on National Marine Fisheries Service data, pinniped strandings have averaged about five per year. As the stranding network in Alaska is developed and rehabilitation facilities are made available, the number of reported dead and stranded animals is likely to increase. However, the institute would not function as an "animal rescue" center, *per se.* Trained staff and protocols would guide decisions concerning how much effort and resources are to be devoted to responding to stricken animals in each

particular case. Under state and federal law, industry is responsible for rehabilitating wildlife injured by spills of oil or other hazardous substances. Through its public education program, the institute would discourage the public from bringing in healthy animals such as pups that appear to be abandoned. Animals which are dead or need to be euthanized would be properly necropsied to determine, to the extent possible, the cause of mortality and to maintain a repository of tissue and blood specimens. A record of each animal processed by the facility would be maintained in a database.

Animals which are recovered to full health and determined to be "releasable" would be returned to the wild. Those which are determined to be "non-releasable" would either be kept at the institute in long term care for research and public education purposes, transferred to other facilities, or, as a last resort, euthanized.

Animals kept at the institute may provide unique research opportunities. For example, all of the live sea otters treated during the EVOS rehabilitation program that were determined to be non-releasable because of debilitating injuries (e.g., organ damage) were sent to facilities outside Alaska (e.g., Vancouver Public Aquarium, Sea World of California, Monterey Bay Aquarium, The Seattle Aquarium). Subsequently, some of these animals have died or have been moved to other facilities. It appears that there may not have been sufficient medical follow-up on the oiled otters or their progeny to document potential long-term spill related health effects and vital information on the effects of oil contamination may have been lost. Medical data from animals obtained through the rehabilitation and research components could provide important insights into processes that are affecting the status of populations in the wild.

VESSEL AND SUBMERSIBLE

The proposed facility could accommodate the basing of a dedicated research vessel and submersible for work in the EVOS area. Currently, restoration projects utilize a mix of private and agency vessels for carrying out marine research and monitoring programs. The UAF SMC operates the only oceanographic vessel in Alaska, the R/V *Alpha Helix*. This vessel is owned by the National Science Foundation and is home ported in Seward. The *Alpha Helix* is part of the University National Oceanographic Laboratory System (UNOLS) and is obligated by NSF for much of the time to work in areas outside of the EVOS area. The *Alpha Helix* is not designed nor equipped to function as a submersible tender. Most submersible work in the EVOS area and elsewhere on the Pacific coast is coordinated by the West Coast National Undersea Research Center (WCNURC) at UAF. At present, WCNURC contracts with a California-based vendor to provide both submersible and tender services to Alaska. A vessel committee comprised of representatives from UAF and ADF&G has investigated the feasibility of acquiring a research vessel and submersible for the EVOS area. The following are the group's findings:

- There are anticipated needs for a dedicated research vessel and submersible to carry out long-term restoration research and monitoring in the EVOS area.

- No one vessel can serve all EVOS needs. Oceanographic sampling, forage fish sampling, submersible tending, etc. all have specific requirements with respect to vessel design and equipment.

- A converted "mud boat" could serve as a multipurpose vessel for submersible tending, forage fish trawling, and oceanographic sampling in Prince William Sound and during summer months in the Gulf of Alaska. However, a mud boat has sea keeping and stability constraints that make it ill-suited for all-weather use in the Gulf of Alaska. A review of available mud boat and seismic vessel hulls and conversion costs indicates that such a vessel could be acquired and equipped for approximately $2.3 million. Annual operation costs are estimated a $1.02 million.

- The DELTA class submersible is an appropriate submersible for anticipated work in the EVOS area. Although the Delta organization will not sell their submersible because of liability and maintenance concerns, a DELTA could be constructed and equipped for lease use in Alaska for approximately $450 thousand. Annual operation costs are estimated at $600 thousand.

- In 1993, the WCNURC chartered the DELTA and tender for 93 days of work in Alaskan waters (including 36 days in the EVOS area plus 10 days in port and transit). In 1994, WCNURC has scheduled 77 days of DELTA charter (including

32 days in the EVOS area plus 10 days in port and transit). The DELTA rents for $3,500 per day without a tender. With a tender, the charter rate is $6,700 per day.

- Vessels in the UNOLS and NOAA fleets are available for all-weather sampling in the EVOS area. Charter rates for these vessels are normally $10,000 per day and up. However, the current over capacity in these fleets and shrinking budgets may provide opportunities for reduced rates if a long-term commitment were made to use one of these vessels for EVOS work.

Conclusion

The long-term EVOS research and monitoring plan may identify the need to acquire a dedicated research vessel/tender and submersible for the EVOS area. A multi-purpose research vessel/tender could be acquired and equipped for approximately $2.3 million; annual operations would cost approximately $1.02 million. A submersible could be leased and equipped for approximately $450,000; annual operation costs would be approximately $600,000. Although a dedicated research vessel could carry out many EVOS projects, additional vessel charter costs would occur for projects that would not be able to use the dedicated vessel because of scheduling or sea keeping/stability requirements. Until a long-term research and monitoring plan is in place, it is recommended that acquisition of a dedicated vessel and submersible be deferred. EVOS research and monitoring projects can continue to be carried out using a mix of private and government-owned vessel charters and submersible charters through the WCNURC.

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SCHEMATIC DESIGN

Introduction

The Schematic Design represents the present state of planning and design which has been generated from the architectural programming process, the conceptual design, visits to other similar facilities and close interaction with SAAMS, Scientific and Education Work Group Members, City of Seward, design team members and special consultants.

In the Schematic Design, the **Research and Rehabilitation** component is the focus of the facility and will consist of a variety of research work areas and research habitats for scientific investigations to be conducted on the marine environment.

The **Education Component** will provide the public the opportunity to view and support the research occurring at the facility as well as involving the visitor in the significance and outcome of those investigations

The **Facility Support** areas of the project will provide the infrastructure, such as life support, mechanical, administration, maintenance, and curatorial functions needed for daily operation and support of the facility.

Research and Rehabilitation Component

The Research and Rehabilitation Component will consist of wet and dry laboratories, staff offices, a research library and computer work stations for the study and rehabilitation of marine mammals, marine birds, and other marine life. There will also be exterior spaces containing tanks and pools and an outdoor research habitat for pinnipeds, sea otters, and marine bird research.

The project's design provides extended research facilities for current and future efforts of the UAF and IMS faculty, and scientists in an integrated program that emphasizes animal health research. Research projects will also be conducted at the facility by a multitude of agencies and organizations including the National Marine Fisheries Service, the National Biological Survey, and the Alaska Department of Fish and Game. The anticipated length of a research project will vary from a few months to a few years. Examples of the types of research which may be conducted include fish genetics, marine bird and mammal food requirements, growth, reproduction, and medical problems associated with the recovery of wild populations.

The Research Component will provide the infrastructure for long-term research and monitoring of the ecosystem affected by the *Exxon Valdez* Oil Spill, with the goal of benefiting the long-term health and restoration of affected resources. The facility is intended to serve as a center for the coordination and integration of on-going and planned comprehensive research and monitoring of the EVOS area as part of an overall restoration plan. The design of the Research and Rehabilitation Component will provide state-of-the-art, flexible research labs to support a variety of changing research activities.

Labs

A series of flexible indoor labs (both wet and dry) and outdoor lab space are included in the design to accommodate the needs of research projects. The indoor labs are located on the lower level (or street level) of the schematic design plan. The outdoor labs (tanks and pools) are located next to the indoor labs. All of the research labs are located on the west side of the facility and adjacent to the IMS site. This provides a link to the IMS campus for research activities.

The visiting public will have limited visual access to view the scientific studies occurring within the lab areas. Current research projects occurring at the facility will be interpreted to the public throughout the facility.

Wet Labs

Wet labs will be provided consisting of large open areas capable of containing a collection of portable tanks and pools for marine mammals, birds, fish or invertebrate research projects. These areas will be "wet" areas and will be designed to have washable and non-corrosive surfaces. Both salt-water and fresh water will be provided to these labs. Water and other utility supply lines will be provided overhead. Drainage lines will be provided in the floor with the capability to isolate contaminated wastes. The design concept behind the location of these utilities is to provide a modular system which allows the researcher to adapt the utility distribution to his or her individual research project. Flexibility is also planned within these labs to accommodate variable lighting levels and ambient environment controls depending on the needs of the research project.

Dry Labs

Two types of dry labs will be provided: smaller / individual dry labs will be assignable to specific research projects and a large central dry lab will be available to all researchers and staff at the facility. Dry labs will be used to conduct chemistry, hematology, physiology, metabolism, isotope, bacteriology and toxicology studies. An electronics lab for the research and development of monitoring devices will also be provided. Freezer storage for tissue and other samples will be adjacent to the dry lab area. Veterinarian and support staff will use the labs to conduct studies on the health of animals at the facility. A photographic darkroom will be provided for developing medical x-rays as well as other photographic materials used by researchers. The dry labs will be provided with scientific casework and laboratory equipment. Husbandry staff will use the central dry lab for daily water quality testing.

Outdoor Tanks and Pools

A combination of tanks and pools will be provided which are located outdoors adjacent to the indoor research labs. These tanks and pools will be used for research projects on marine mammals, birds and fish. Both permanent outdoor pools and open space for a more flexible arrangement of portable tanks and pools is included in the design. This outdoor area is essentially an outdoor working research lab able to accommodate a variety of changing research projects. It will be provided with an appropriate amount of shelter from wind and precipitation for both researchers and animals such that this space can be used throughout the year.

The outdoor tanks and pools will be located adjacent to indoor wet labs with large overhead doors to allow the transportation of research tanks and pools between the indoor and outdoor lab areas. Other design features will include an overhead crane to lift large marine mammals in and out of pools, outdoor lighting for winter work, corrosion resistant materials as well as a flexible arrangement of required utilities.

Habitats

Naturalistic research habitats are included in the design to provide for the long-term care of those marine mammals and birds involved in specific research programs. It will, to the extent possible, duplicate the natural environment for proper husbandry and behavioral studies. It is anticipated that research on animal sensory systems, behavior, physiology, growth, nutritional needs, reproduction and other life history aspects will be conducted.

The naturalistic research habitat will be designed to included four individual habitats for Steller sea lions, seals, sea otters and marine birds. The design of the naturalistic habitat will consist of wet pools, dry haul out and resting areas. Rock cliffs will form and enclose the habitats. The design of the rock surfaces will consist of a combination of artificial and natural rock work. Researchers will have dedicated access to marine mammal haul out spaces and marine bird burrows. The habitat will include provisions for the separation of species groups and specific individual animals as needed for specific scientific and husbandry projects. The naturalized setting will be designed and constructed to exceed existing regulatory requirements and industry established standards.

The visiting public will also have access to view the animals in the naturalistic research habitat. Both above water and below water viewing will be provided. Current research projects occurring at the facility with the animals in the habitats will be interpreted to the public.

Veterinary, Husbandry and Rehabilitation
Veterinary and husbandry areas necessary for general animal care activities are provided in the design. These areas will be shared by visiting researchers and veterinarian and husbandry staff and consist of animal quarantine and rehabilitation, animal care and treatment clinic, and food services.

The animal quarantine area is needed to isolate and treat animals entering the facility or to treat sick animals already at the facility. These quarantine areas are required for marine mammals and birds to prevent to possible transmission of disease to healthy animals. These quarantine / critical care areas will also be used for incoming stranded animals in need of rehabilitation. The quarantine areas will be capable of accommodating marine mammals, marine birds or fish and will be designed to provide variable temperature and light depending on the needs of the animal to be accommodated.

The animal care and treatment clinic will provide veterinary services and treatment areas for animal health services. This area consists of offices for veterinary staff, surgery, treatment and necropsy areas. A centrally located food service area will provide food storage and preparation areas for feeding marine mammals and birds. It is anticipated that the facility will accommodate short term food storage and that long term food storage will be secured off-site.

Rehabilitation
The facilities offered by the Research and Rehabilitation Component will promote the recovery of marine mammal and bird species that were injured by the EVOS through treatment and rehabilitation of such species as they are found in the wild. The facilities will be shared with the Research Component in an integrated program that emphasizes animal health research. The facility will include tanks and pens (temporary holding, long term habitat, and quarantine), life support system (running sea water and disinfection), food preparation, pathology and water quality laboratory, x-ray, surgery, pharmacy, and necropsy.

One of the goals of wildlife rehabilitation services at the proposed project is to restore the health of individual animals in order that they can be released to the wild. Another goal is to establish and maintain a database on animal health issues based on studies of wildlife at the facility. Wildlife which can no longer survive in the wild, or which present a health risk to wild populations, will be kept at the proposed facility in long-term care for research and public education purposes, transferred to other appropriate facilities, or as a last resort, euthanized.

As a "stranding center," the Center will have trained staff and resources to respond to incidences involving sick, injured, or dead marine mammals and marine birds in the northern Gulf of Alaska. Based on National Marine Fisheries data, pinniped strandings have averaged about five per year. As the stranding network in Alaska is developed and rehabilitation facilities are made available, the number of reported dead and stranded animals is likely to increase. However, the Center will not function as an "animal rescue" center, *per se*. Trained staff and protocols will guide decisions concerning how much effort and resources are to be devoted to responding to stricken animals in each particular case. Under state and federal law, industry is responsible for rehabilitating wildlife injured by spills of oil or other hazardous substances. Through its public education program, the Center would discourage the public from bringing in healthy animals such as pups that appear to be abandoned.

Animals which are dead or need to be euthanized will be properly necropsied to determine, to the extent possible, the cause of mortality and to maintain a repository of tissue and blood specimens. A record of each animal processed by the facility will be maintained in a database. These results will provide valuable information on the health of the marine environment to guide EVOS Trustee Council restoration decisions and other agencies' policies.

Animals kept at the Center will provide unique research opportunities. Medical data from animals obtained through the Rehabilitation and Research Components may provide important insights into processes that are affecting the status of populations in the wild.

Education Component

The public Education Component of the ASLC / IMS Infrastructure Improvements will engage the visitor in the research, rehabilitation and husbandry activities occurring at the facility. The mission of the education and visitation component is to offer the message of environmental responsibility of Alaska's marine resources through educational programs. The research and rehabilitation activities involving indigenous seabird, pinniped, sea otter, and fish and invertebrate species will be the education exhibit focus. The visitor will be exposed to the interaction of research and animal care activities for the above species and the general ecology of the region through the use of the naturalistic research habitat, video, graphics, printed materials and interpretation with trained docents or researchers in laboratory conditions. The proposed facility will complement marine programs in educational institutions across the state.

The emphasis of the Education Component will be placed upon communicating current research activities and events within the institution and EVOS region that are contributing to general knowledge of the EVOS area and beyond. This current events program will be integral to the continuing success and public interest at the institution. The nature of this activity will constantly create new information and activities that will need to be communicated to the general public and educational groups.

The design of the facility will integrate the Education and Research Components such that the visiting public is able to view the research currently being conducted without interfering with the research itself. The visiting public will have the greatest viewing access to the naturalistic research habitat but they will also have an overhead view into the research wet labs, dry labs and outdoor tanks and pools area from the upper floor level. Specific educational programs can provide small groups tours directly into the research lab areas.

The Education Component of the project will function in concert with and in support of, the Research Component. The capital funding of the Education Component will not come from the Trustees Council Joint Funds (as defined by the Memorandum of Understanding and Consent Decree), but from other sources. The Education Component will provide, via admission fees, parking fees, and sales of educational materials charged to its visitors, financial support for the operation of all aspects of the facility.

Facility Support Areas

Facility support areas are necessary for the daily operations of the Center and are shared by the Research Component and Education Component. Facility support areas include a life support system, mechanical, electrical, administrative offices, building security, maintenance and building service areas. The design of the facility places the "back-of-house" spaces, such as life support, in the below grade level of the building. The lobby and public services will be provided on the street level and administration is planned to occur on the upper level.

The Life Support System (LSS) will supply sea water from Resurrection Bay similar to natural conditions for the support of the live tanks, live pools, wet laboratories and the research habitat. The sea water will be free of debris, pathogenic bacteria and viruses in compliance with regulatory requirements and industry established standards. The LSS includes pumps, piping, valves for intake, discharge and circulation, the filtration system, ozone generation system and emergency circulation. Any contaminated water will be treated before being returned to the bay.

Exterior Building Design

The exterior finishes of the building will be in keeping with the status and mission of the institution that they protect from the elements. The roof forms will be a combination of flat and sloped surfaces and will be designed such that the views from downtown Seward to the bay will not be inappropriately blocked. On August 3, 1994, the Seward Planning and Zoning Commission approved a variance permit which allows the maximum building height for the proposed project to exceed the existing 34' height limitation. The average height of the building will be 40 feet with limited portions of the building at 48 feet above street level. The primary aesthetic feature of the complex will be the integration of local architectural elements with the new habitat forms.

Through the use of materials and specific design elements the architectural character of the new Center will honor the context of the buildings on Railway Avenue. The visual line of the bus drop off canopy will reflect the single story character of the older, possibly historic buildings across the street. Stucco, natural or synthetic, may be used in specific locations, such as for the exterior finish of columns or of the canopy itself, to reflect the use of materials similar to those on the surrounding buildings.

Architectural Systems

Floors
The proposed floor system will consist of a concrete slab on grade for the basement and concrete structural slabs for the first and second floors.

Finishes: Proposed floor finishes will balance the need for long wearing, durable products with aesthetics and desired flexibility of uses.

Wet Labs / Animal Treatment Areas - sealed concrete
Dry Labs and Work Areas - vinyl
Offices - carpet
Public Areas - carpet and tile
LSS / Mechanical / Electrical / Storage- sealed concrete
Janitorial / Support Areas - vinyl tile

Walls
The building will be framed with a combination of concrete and wood columns and beams. Wood beams and trusses will be used where the structural system is exposed to the interior.

Exterior Walls: Concrete and masonry with a minimum of R-30 insulation. Interior side of walls in lab areas will be masonry with a polyurethene coating. Interior side of other work areas will be gypsum board with a final finish. Exterior side of walls will be predominately masonry with architectural metal panels, wood trim, and stucco (natural or synthetic).

Interior Partitions: Masonry interior partitions with a polyurethene coating in wet labs and animal treatment areas and metal partitions with gypsum board facing throughout the remainder of the building. Acoustical insulation will be provided as needed. Final finishes will include paint, wall fabric, or tile as each space warrants. Special attention to the execution and finish in animal treatment areas and research labs will be provided.

Roof and Ceiling Systems
Roofs: The proposed roof system will consist of a combination of metal roof finish on a plywood deck for the sloped portions of the roof and an IRMA roof system on the flat portions of the roof.

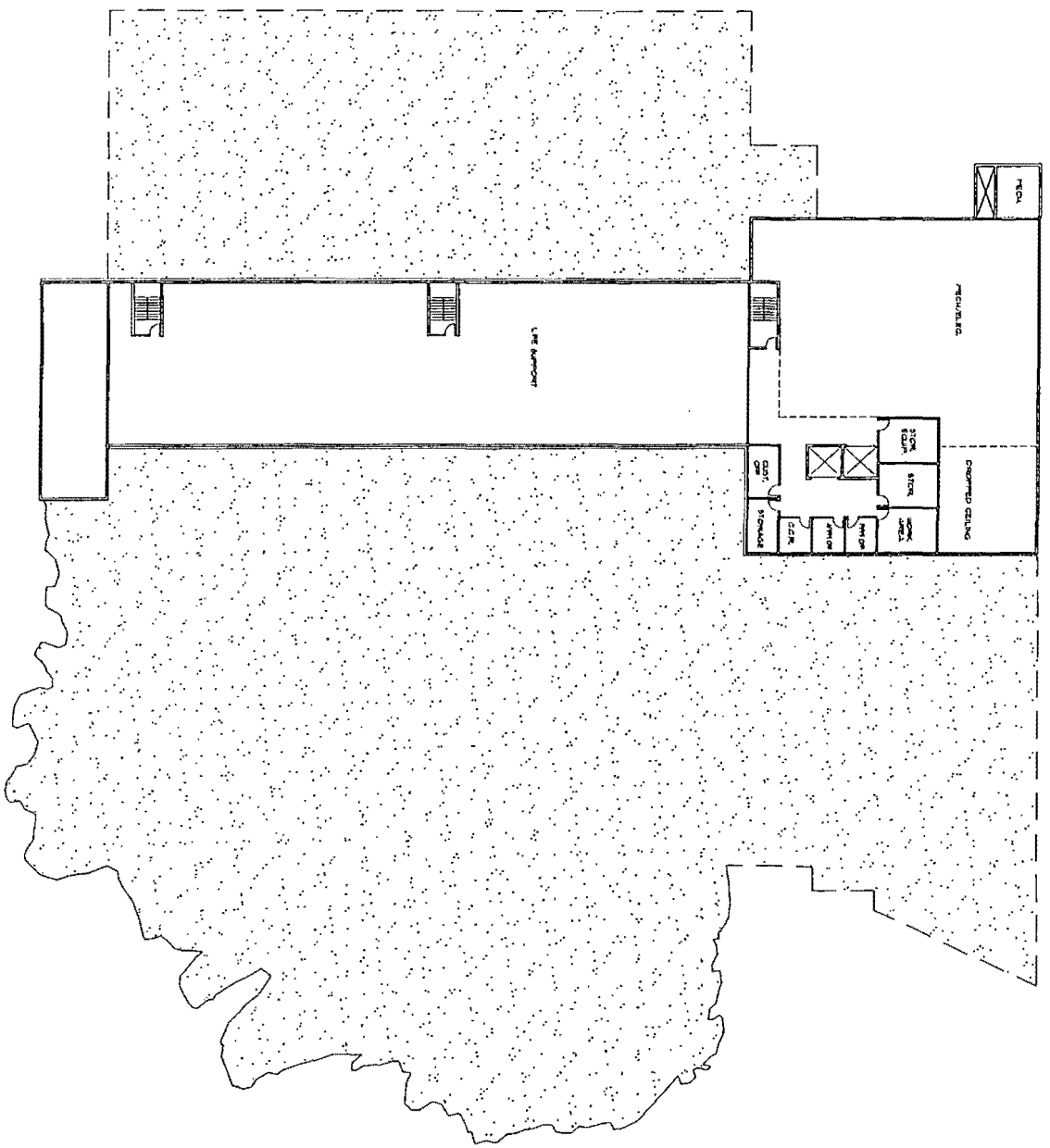
Ceilings: Wet labs and animal treatment areas will be open to the underside of the concrete floor framing above. Dry labs and research work areas on the lower level will have either a lay-in tile or gypsum board ceiling. Public spaces, library, classroom and offices on the upper level will be open to the wood framing of the roof above.

Doors and Windows
Exterior Doors: Doors will consist of a combination of metal and glass. Exterior doors for public use will be glass (store front) with metal trim and be part of a glazed door and window system. Doors for employees and research staff will be painted or prefinished metal. Overhead garage doors will be provided at the loading dock and wet labs. Corrosion resistance will guide final material selections.

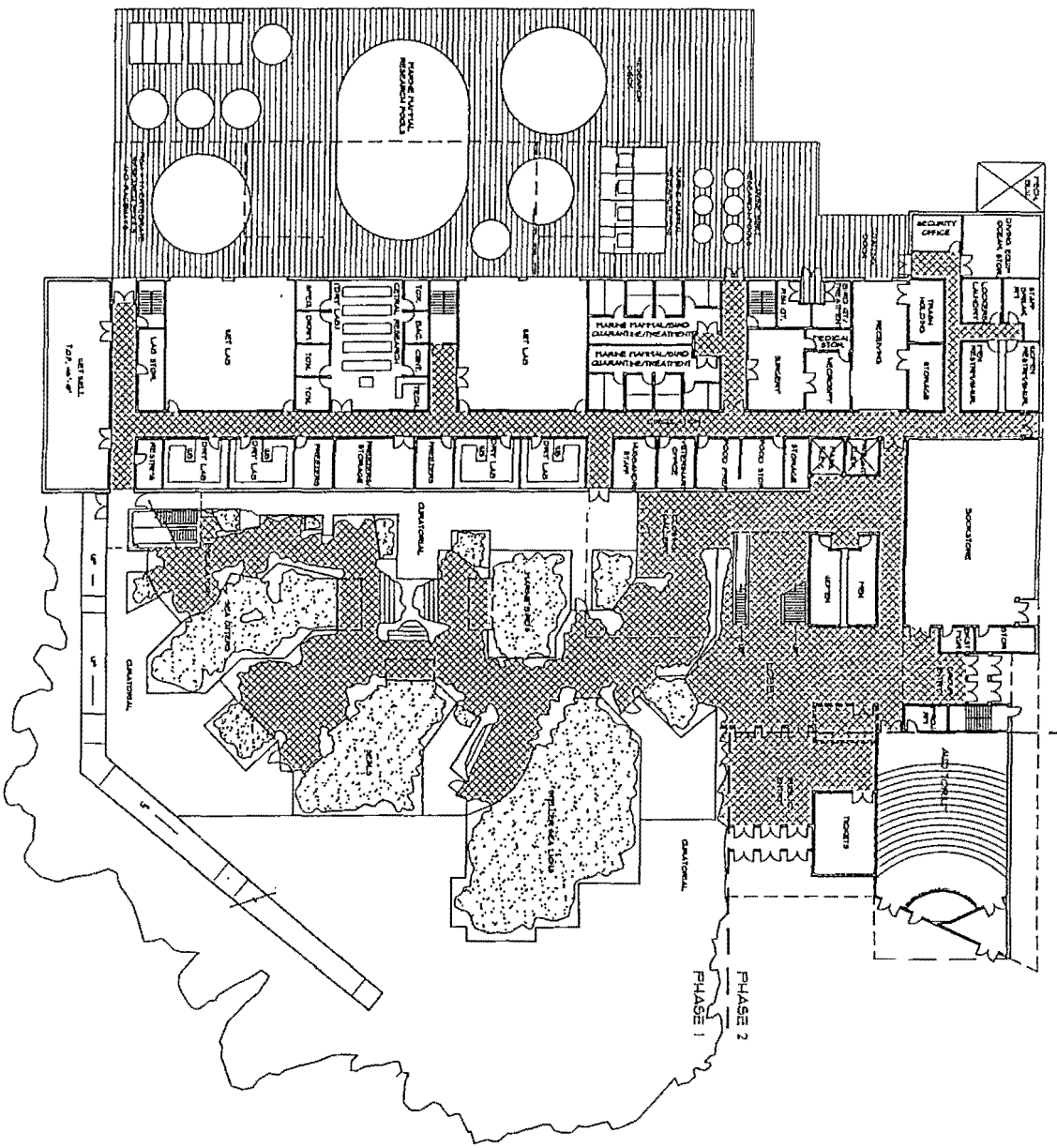
Interior Doors: Interior doors in public areas and for offices will be clear finished wood doors. Research labs, storage areas and facility support areas will have painted metal doors.

Windows: All exterior windows will be low maintenance frames with insulated glazing units. Windows used between interior spaces will be wood or metal frames with single safety glazing.

Translucent Window System: An insulated translucent window panel system will be used to provide additional natural lighting throughout the building.



SHEET NO.	TITLE BASEMENT PLAN	PROJECT NO. 401.00 DRAWING NO. M-00 REVISION NO. DATE SEPT. 1, 1994		LIVINGSTON SLONE ARCHITECTURE ENGINEERING PLANNING INTERIOR DESIGN	Cambridge Seven Associates, Inc. Architects and Exhibit Designers	SAAMS ALASKA SEALIFE CENTER IMS INFRASTRUCTURE IMPROVEMENTS SEWARD, ALASKA



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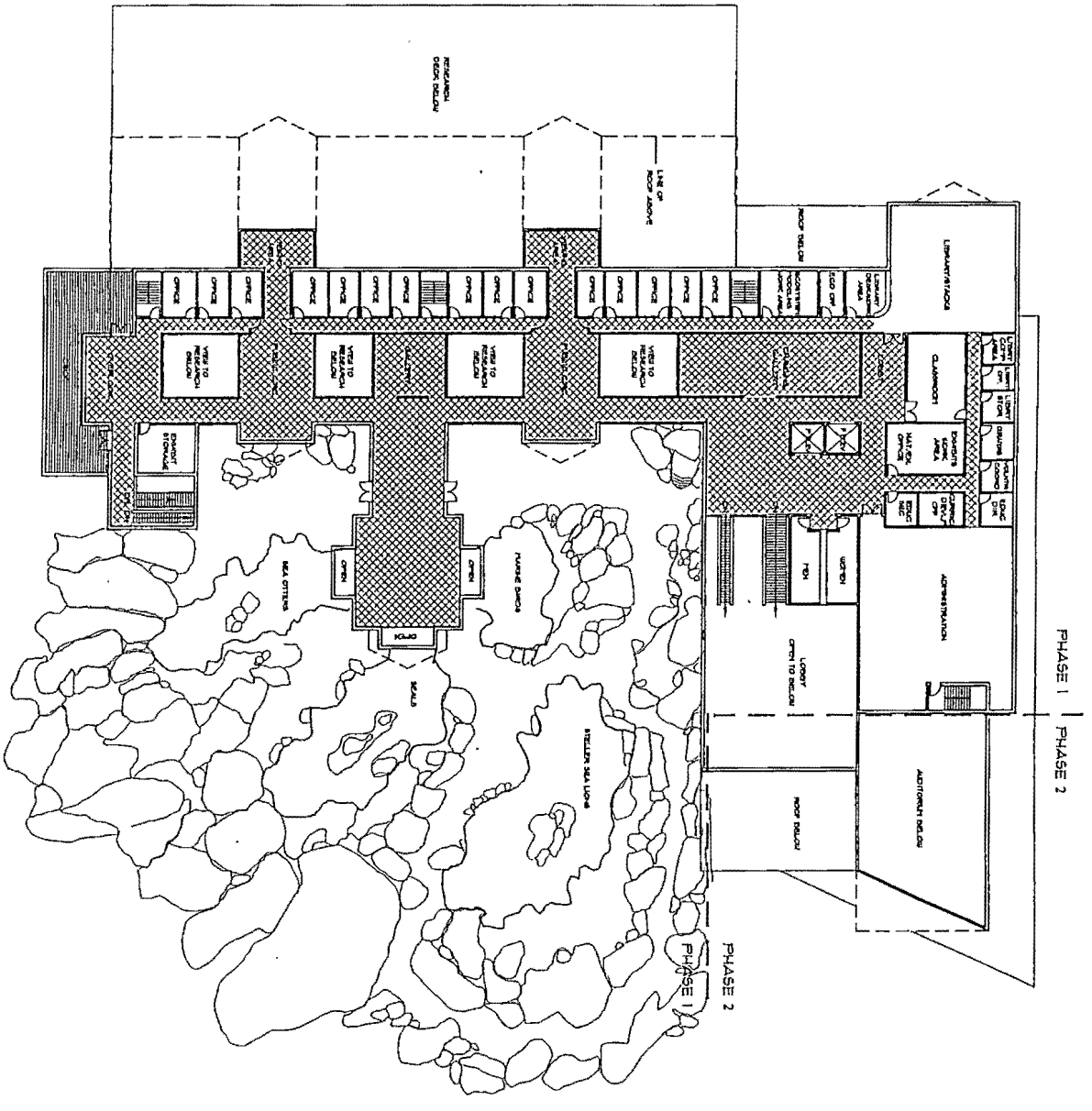

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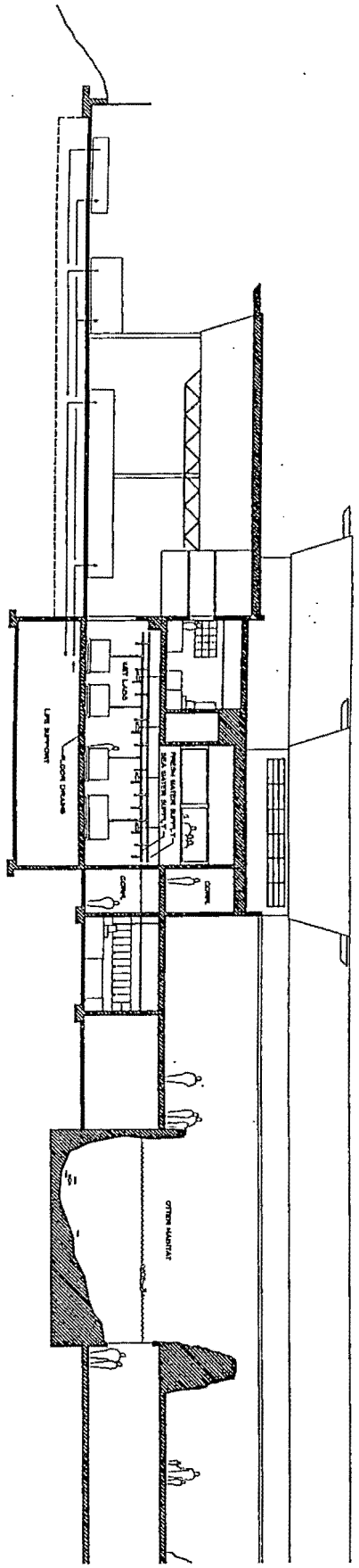
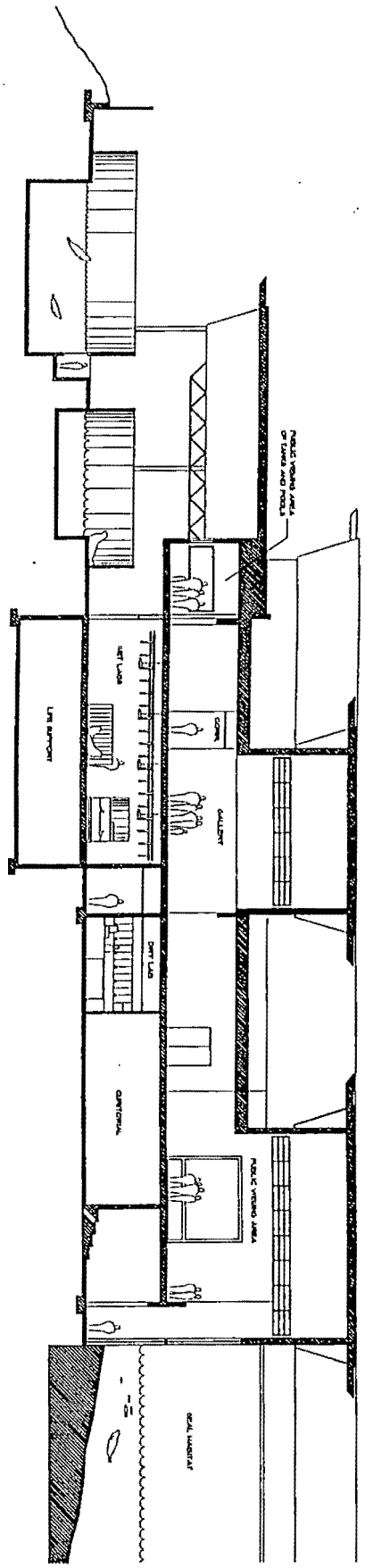
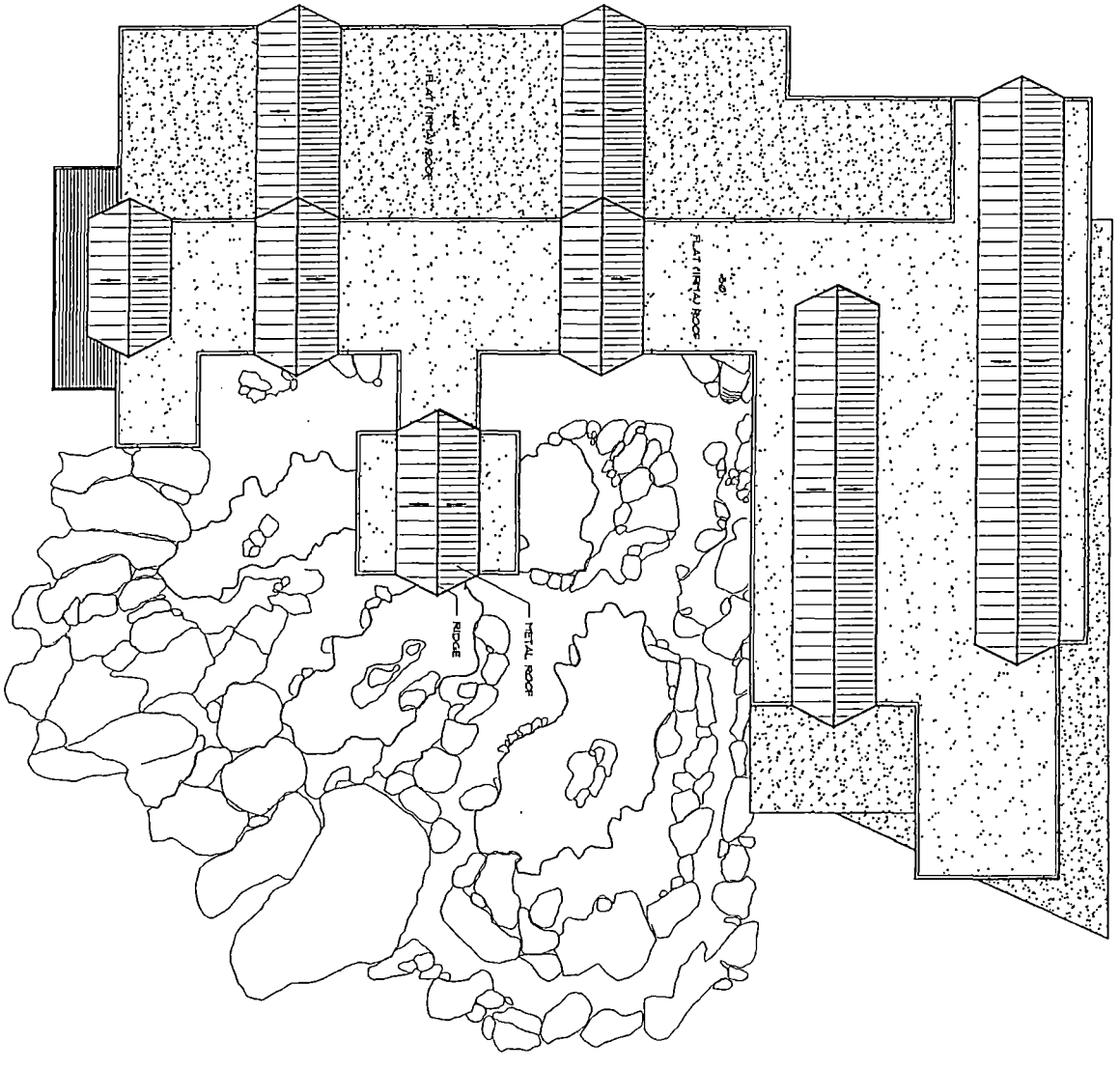




SHEET NO.	TITLE SECTIONS	PROJECT NO. 401.00 DRAWN BY: REVIEWED BY: DATE SEPTEL 1994	LIVINGSTON STONE ARCHITECTURE 3600 ARCTIC BOULEVARD ENGINEERING SUITE 200 PLANNING ANCHORAGE, ALASKA 99503-3798 INTERIOR DESIGN TEL (907) 562-3000 FAX (907) 561-4045	Cambridge Seven Associates, Inc. Architects and Exhibit Designers [illegible]	SAAMS ALASKA SEALIFE CENTER IMS INFRASTRUCTURE IMPROVEMENTS SEWARD, ALASKA



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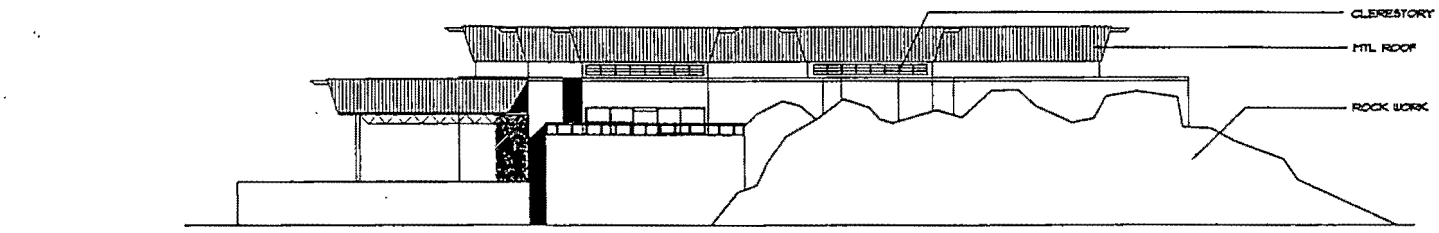
SHEET NO.	TITLE ROOF PLAN	PROJECT NO. 401.00 DRAWN BY: HYO REVIEWED BY: DATE SEPT. 1, 1994		LIVINGSTON SLONE ARCHITECTURE ENGINEERING PLANNING 3000 ARCTIC BOULEVARD SUITE 300 ANCHORAGE, ALASKA 99503-3700 TEL 907 561 3000 FAX 907 561 4625	Cambridge Seven Associates, Inc. Architects and Exhibit Designers 2067 Massachusetts Ave. Cambridge, MA 02140 617 868-7000 Fax 868-7021	SAAMS ALASKA SEALIFE CENTER IMS INFRASTRUCTURE IMPROVEMENTS SEWARD, ALASKA



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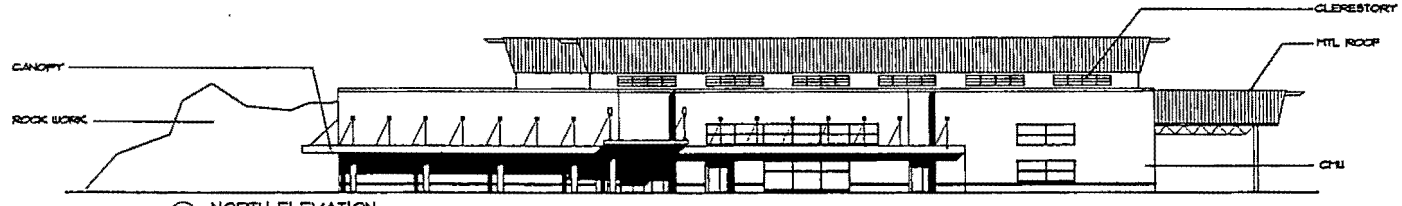

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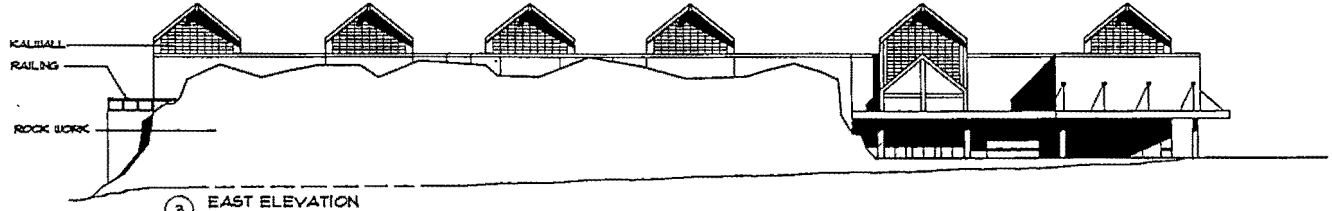

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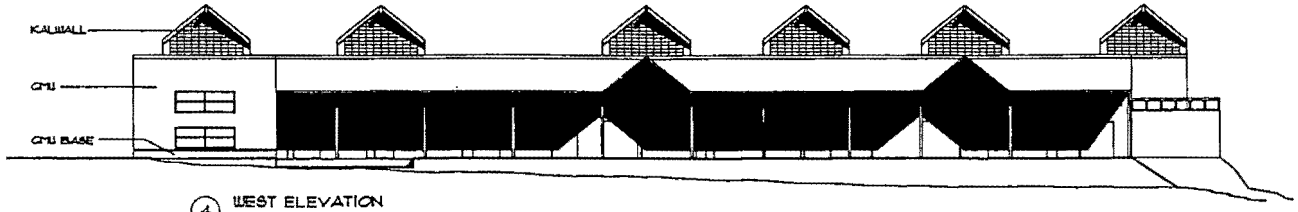

4 WEST ELEVATION
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SAAMS

ALASKA SEALIFE CENTER
IMS INFRASTRUCTURE IMPROVEMENTS

SEWARD, ALASKA

Cambridge Seven Associates, Inc.

LIVINGSTON SLONE

PROJECT NO. 401.00
DRAWN BY: HAI
REVISED 8/31/5
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TITLE
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SHEET NO.

Introduction: Alaska's Challenge

Much of Alaska's vast wilderness is comprised of pristine habitats that have virtually been untouched by humankind. Ranging from the Northern Arctic and Alpine Tundra through the mid-range Boreal Forest, to the Coastal Rainforest that spreads from Eastern Kodiak Island south through the Panhandle, Alaska's habitats are the results of constant, yet gradual, global change. Throughout eons of geological evolution, as well as the recent periods of glaciation, Alaska's ecosystems have adapted and re-adapted, creating new niches for life to form and re-form.

The gradual pace of this adaptive change as defined by the laws of evolution is unable to match the rapid pace of change caused by humankind, especially those of the late 20th century. People have developed skills with which to populate diverse habitats around the world, many of which would naturally be considered hostile to the human species. Human ability to learn not only to conquer nature but to proceed in concert with it, and to perhaps develop a sustainable lifestyle, is at the core of the educational and scientific activities at the Alaska SeaLife Center.

Alaskan geology and ecosystems will be presented in terms of natural and man-made changes that have altered the environment or may affect it in the future. Exhibits will introduce visitors to the natural, indigenous ecosystems of Southern Alaska and will call attention to ongoing processes of natural evolution. More specifically, the exhibits at the ASLC will provide information on the effects on the environment of the latest major man-made event, the Exxon Valdez Oil Spill (EVOS).

The oil spill has made us aware, as one Alaskan observed, that we did not know what we had and what we could lose. Currently, many research and scientific monitoring studies on Alaska's marine resources and ecosystems cannot be conducted at existing facilities in Alaska. The ASLC will provide the required infrastructure for conducting long-term research and monitoring programs that are needed to restore and enhance the natural resources and services that have been injured by the oil spill. Five years after the spill, many resources are not recovering. Research scientists at the ASLC will strive to understand the factors constraining recovery. Their studies will be interpreted in gallery exhibits throughout the ASLC, so that the visiting public can gain valuable insight into the problems as well as the success stories.

Educational Focus

Visitors' journeys through the Alaska SeaLife Center will revolve around the core theme: "We did not know what we had until we lost it."

Scientists will be working not only to determine what "we had" but to understand why resources are not recovering from the Exxon Valdez oil spill. Scientists will be further charged with initiating, sustaining, and accelerating recovery, and finally, they must monitor that recovery over the decades to come.

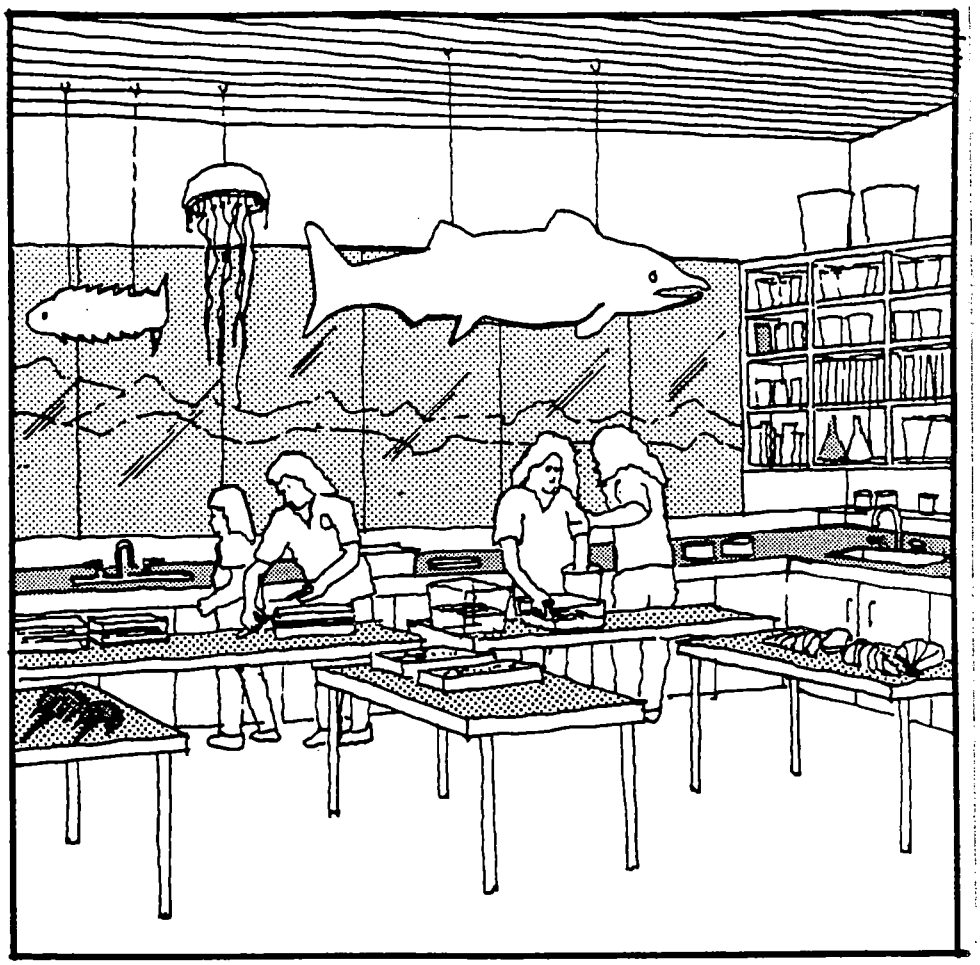
Since the primary focus of the ASLC is that of research, the interpretive bridge between researchers and visitors will be vital. Through a variety of visual, aural, verbal and kinesthetic interactives, visitors will have a multitude of paths to choose that will help them understand the research that is taking place.

Thematically, the educational focus is to inform all visitors about **awareness**. Though there were several monitoring systems in place pre-EVOS, a total picture has not been painted of this fragile environment. A second theme is **restoration**, which is why the ASLC exists, to study the effect the oiling has on humankind and their ecosystem, and how mitigation must occur to conserve and sustain the various species within that ecosystem. Research on the impacted species and environment will be the key to the future of the Southern Alaska Coastal region. The ASLC's Education Program will strive to create an understanding that each individual can take an active role to ensure a solid, sustainable future.

The Exhibit Narrative describes the educational experience for self-guided visitors to the ASLC. Special, guided tour groups comprised of students, teachers, or scientists will have the opportunity to be exposed to additional classroom and auditorium programs, educational packets, and behind-the-scenes tours. Some groups will be led by educational staff and volunteers; others will be led by visiting scientists.

Student groups, for example, will meet in the auditorium or a classroom for a brief introduction and overview. They will be given specific information concerning the "current headline" (exhibited in Gallery 3), and they will be asked specific questions to determine the learning outcomes. The question and answer session will be done informally, but information gathering will take a more formal path, such as research sheets, geared to the subject at hand. Some sort of reward, a sticker or patch could be given to students who answered the most questions.

Scientific tours will interact in each of the galleries for longer periods with more specific questions. Teachers will interact with the education staff and volunteers to enhance their own knowledge base and to look for ways of expanding their curriculum presentations for students.



Sketch View #3

Educational Experience

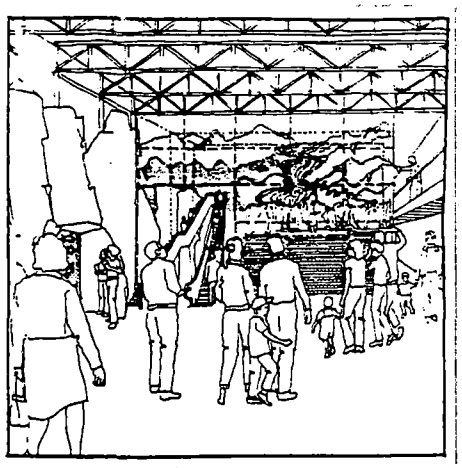
The following narrative is the educational sequence that the typical, self-guided visitor will experience in the Alaska SeaLife Center. The educational exhibits will include natural habitats and scientific activities, film, sound, video, and researcher presentations as well as educational graphic, photographic, and interactive displays. The interpretive information will be presented in an interdisciplinary manner to incorporate information from marine biology, geology, math, literature, art, anthropology, and history. Exhibits will range from large, walk-through research habitats to more traditional diorama habitats and tank displays. Research activities will be seen in laboratory settings.

The processes of environmental change will parallel the presentation of living things. These impacts will range from geological and other natural processes to those imposed by man, some destructive, such as the EVOS, and others beneficial.

The primary components of the educational experience can be divided into four sections: a) Orientation Exhibit—People's Influence on the Natural Habitats of Alaska; b) Changing Exhibits; c) Alaska's Southern Coastal Habitat—Rookery and Research Exhibits; and d) Closing Exhibit—Stewardship and Sustainable Living.

Orientation Exhibit-
People's Influence on the Natural Habitats of Alaska

The Orientation Sequence in the Alaska SeaLife Center begins in the Lobby, where a montage of translucent murals and a live freshwater stream habitat (T.14) will juxtapose the enormity and range of Alaska's natural environment with people's growing influence and effect on the region. At the far end of the Lobby, visitors will continue up the escalator or stairs to **Gallery 1** on the second level, where the Orientation Sequence continues with a closer look at the diverse habitat of southern Alaska, one of the richest in the world.

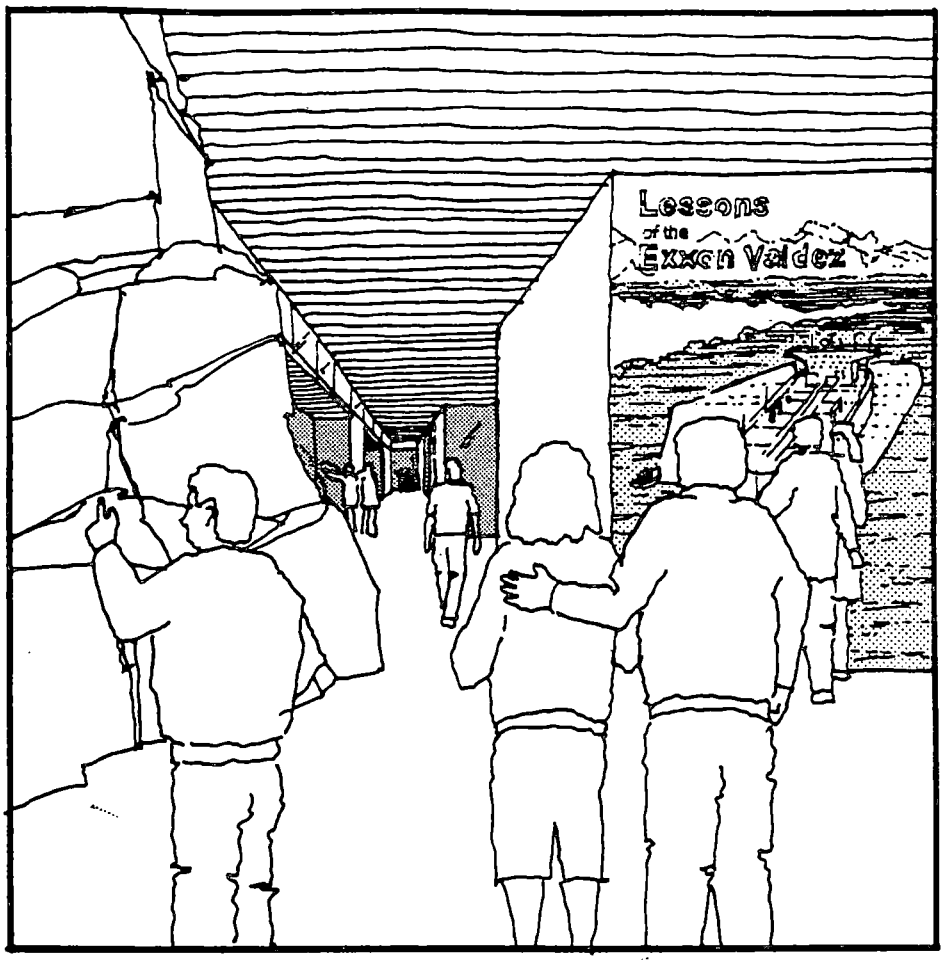


Sketch View #1

Sketch View #2

At this point, visitors will get a second look at the first live animal exhibit, the Freshwater Stream (T.1) that they will have seen in the lower Lobby. The indoor and outdoor Freshwater Riparian Stream habitat will contain fishes, invertebrates, reptiles, and insects in micro-habitats.

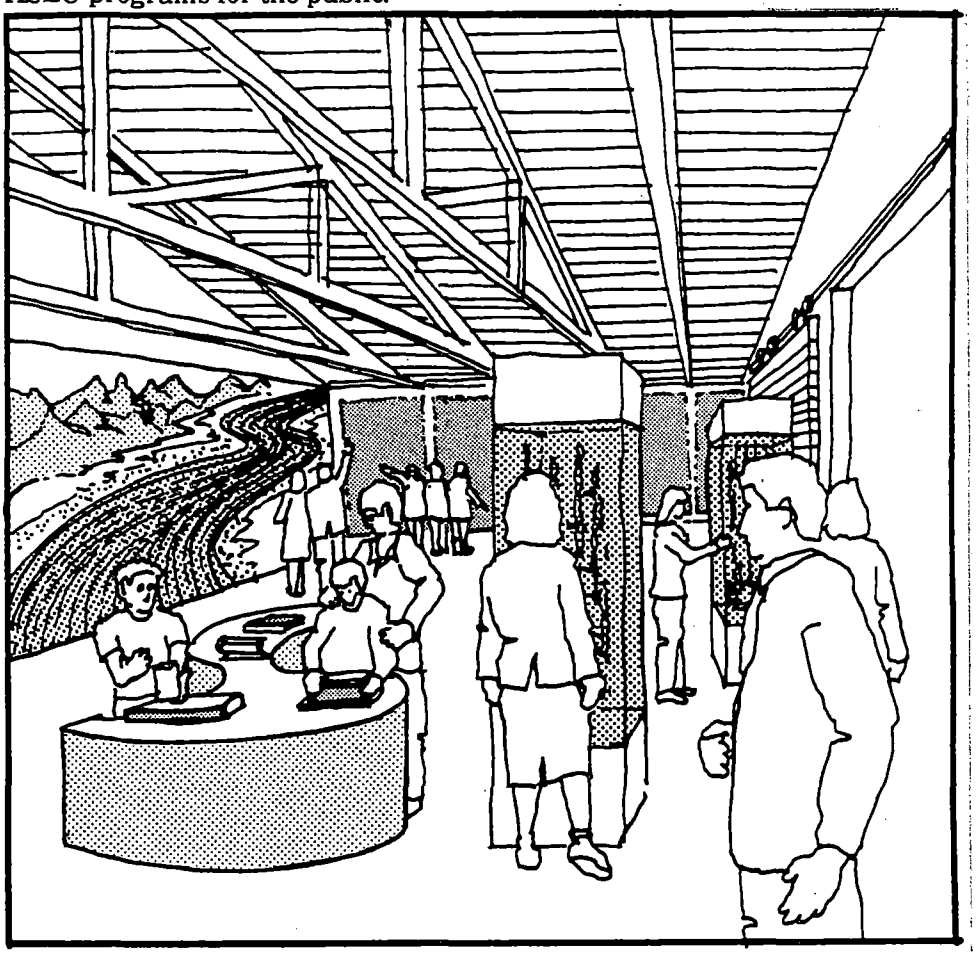
The culmination of the Orientation Sequence is an exhibit that describes the Exxon Valdez Oil Spill, the most significant man-induced environmental disaster of recent decades. **Gallery 2** will focus on the Exxon Valdez Oil Spill and the ASLC's mission, that "the oil spill makes us aware that we did not know what we had and what we could lose." Here, visitors will be introduced to some of the myriad problems and restoration efforts that have occurred in the local region since the catastrophe, ranging from declines in harbor seal and sea lion populations, to long-term disturbances to marine bird colonies, to lethal injuries to the upper intertidal zone.



Sketch View #5

Changing Exhibits

Visitors will have the option of entering **Gallery 3**, the Changing Exhibits Gallery, which will be a flexible, ongoing, and ever changing presentation of the research and monitoring activities associated with the Exxon Valdez Oil Spill Impact Zone. Video and active display systems describing current ASLC research as well as regional activities, both naturally occurring and man-made, will be continually updated. These changing exhibits will be supported by staff, research and animal care professionals, as well as volunteers who will interpret the significance of the current ASLC programs for the public.



Sketch View #4

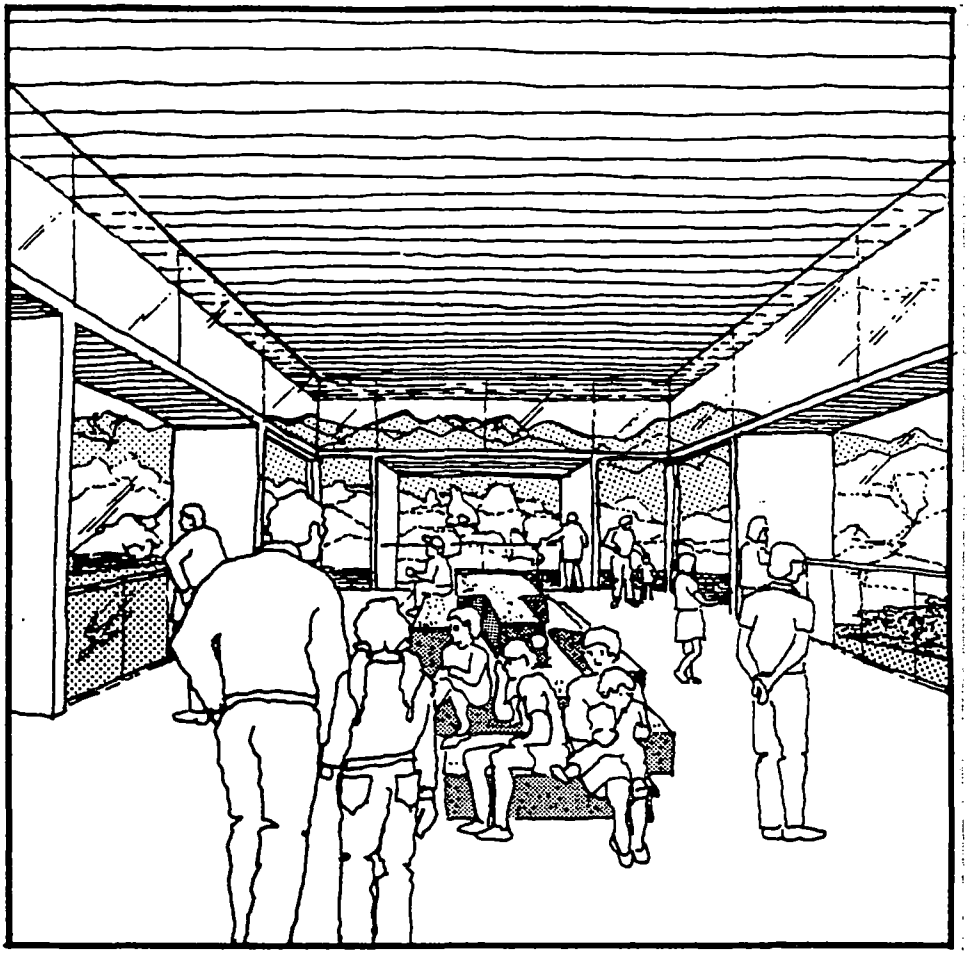
Alaska's Southern Coastal Habitat

Leaving the Changing Exhibits Gallery, visitors will arrive at the first of a sequence of exhibit galleries, where live-link video monitors, interactive devices, and direct visual contact will present and interpret current information to visitors. **Gallery 4** will overlook the Quarantine and Critical Care Unit of the ASLC. Here, visitors will be introduced to the animal rescue and care procedures that are employed in the ASLC, augmented by video links into the Critical Care Unit below as well as the outdoor holding tanks. Diagrams showing the locations of strandings in Alaska will also explain current hypotheses of why the marine mammal populations are declining. Visitors will learn what they should do if they spot an injured animal along the coast. Through Gallery 4, visitors can also exit onto a Pool Viewing Area, where they can observe from afar some of the rehabilitating animals in the large tanks on the lower level.

Gallery 5 will feature a Visitor Lab Station, operated by docents, which will reflect the current research projects of the ASLC. To augment the viewing windows that look into the actual Wet and Dry Laboratories located below, activities that focus on ocean studies, endangered, threatened and injured species, diving physiology, mammal recovery, restoration, and release, testing of telemetry equipment, understanding of food web relationships, fish genetics, biodiversity, and countless others will be presented. Visitors, for example, will use microscopes to study first-hand the region's water quality; they will be invited to touch some of the underwater plants of the Gulf; and they will learn how oil and other contaminants affect feathers and fur. Other hands-on interpretive opportunities will be developed to reflect the research in the Labs below.

Sketch View #7

Visitors can observe the Rookery Habitat during bad weather without venturing outdoors in the **Indoor Viewing Pavilion**, which is adjacent to Gallery 5. "Listening Stations" and "Field Guides" at the two-level viewing windows will provide interpretive information about the seals, marine birds, and sea otters in the rookery as well as explanations of the scientific research taking place in the rookery. The Indoor Viewing Pavilion provides above-water viewing into a landscape of windblown and surfworn rocks similar to those just outside, along the shores of Resurrection Bay.



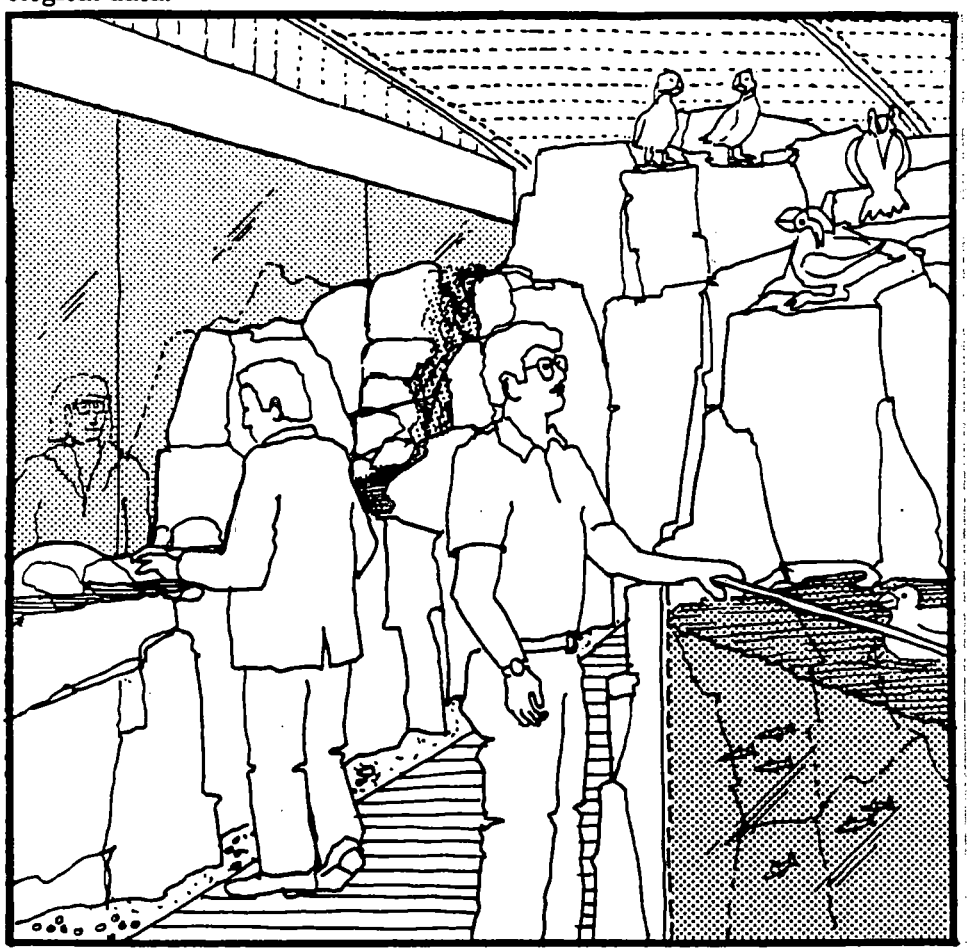
Sketch View #8

At this point visitors will have the fantastic opportunity to move outdoors to the upper level of the main **Rookery Habitat**. The Rookery, which is seen both above and below water, is the major habitat at the ASLC and, through a series of compressed environments, represents the South Alaskan coastal habitat for sea lions, seals, sea otters, marine birds, fishes, and invertebrates. All of the animals on view will be part of the research and rehabilitation function of the ASLC.

During good weather, visitors will want to walk through the rookery. They may borrow "field guides" at the revolving doors, carry them through the Rookery Habitat, and return them at the end of the outdoor experience. Other interpretive material will be seen on small totems adjacent to the boardwalk. These interpretive totems will each be capped by a carving created by a Native Alaskan artist. Each carving will

represent one of the animals in the Rookery as well as a different tribe of the region. With minimal signage in the rookery, visitors will rely on a corps of volunteers and scientists for information concerning the daily research activities and animal care.

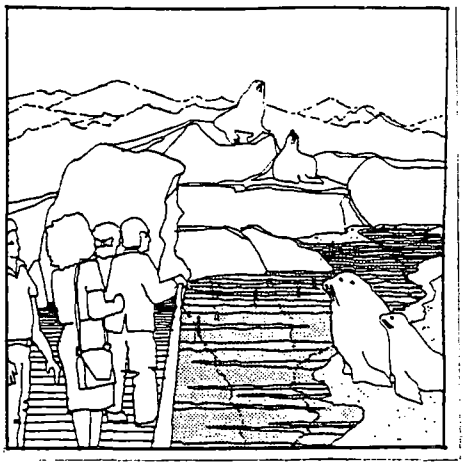
The first outdoor habitat will feature **Marine Birds** (T.2) and will contain many species that have been affected by the oil spill, including murres, marbled murrelets, harlequin ducks, puffins, auklets, and others. The birds will be perched on the rock cliffs, resting on the bank, or swimming and diving for live food in their portion of the rookery. Scientists will be studying the birds' diving, prey selection interactions, and other physiological data.



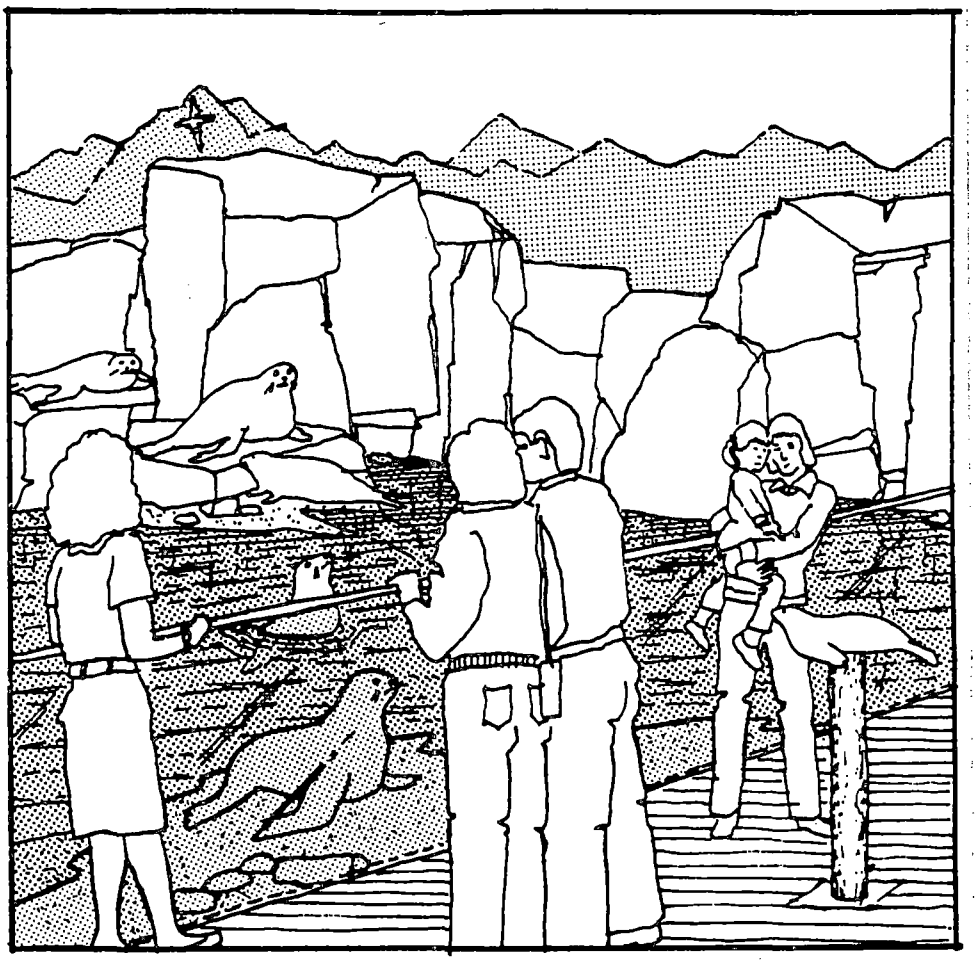
Sketch View #9

Moving to the back of the rookery, visitors will encounter the outdoor section of the **Freshwater Stream** (T.1), the riparian habitat that they will have seen earlier, indoors. The waterfall and larger stream, featuring trout, salmon, grayling, and other species, will be visible from above and through low acrylic panels as the stream flows to the deep sink, seen in the Underwater Gallery and Lobby.

Continuing on the boardwalk, visitors will find themselves directly in front of the largest residents in the rookery, the **Steller Sea Lions** (T.3). Whether perched high on the rockwork, basking on the beach, or swimming in the water, the Steller sea lions will be impressive and raucous, creating a lively habitat for public view. A second habitat, featuring the more passive **Harbor Seals** and **Fur Seals** (T.4) will be adjacent to the Steller sea lions.



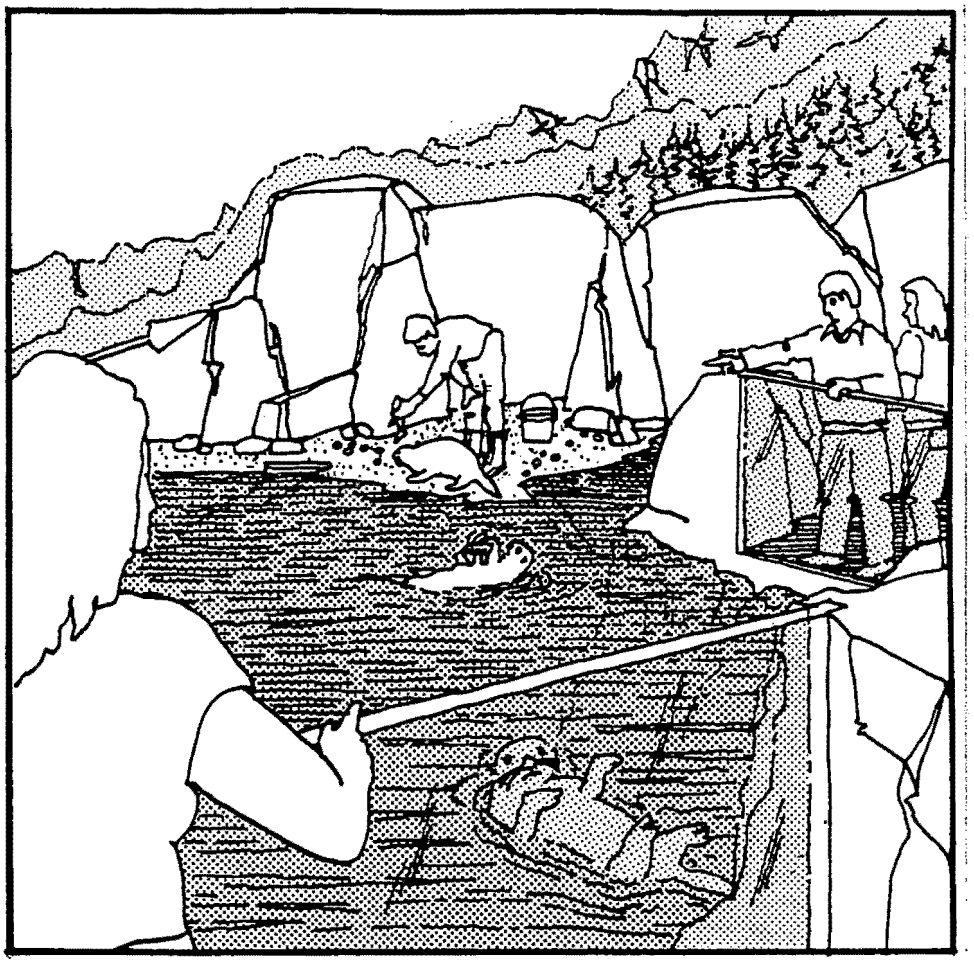
Sketch View #10



Sketch View #11

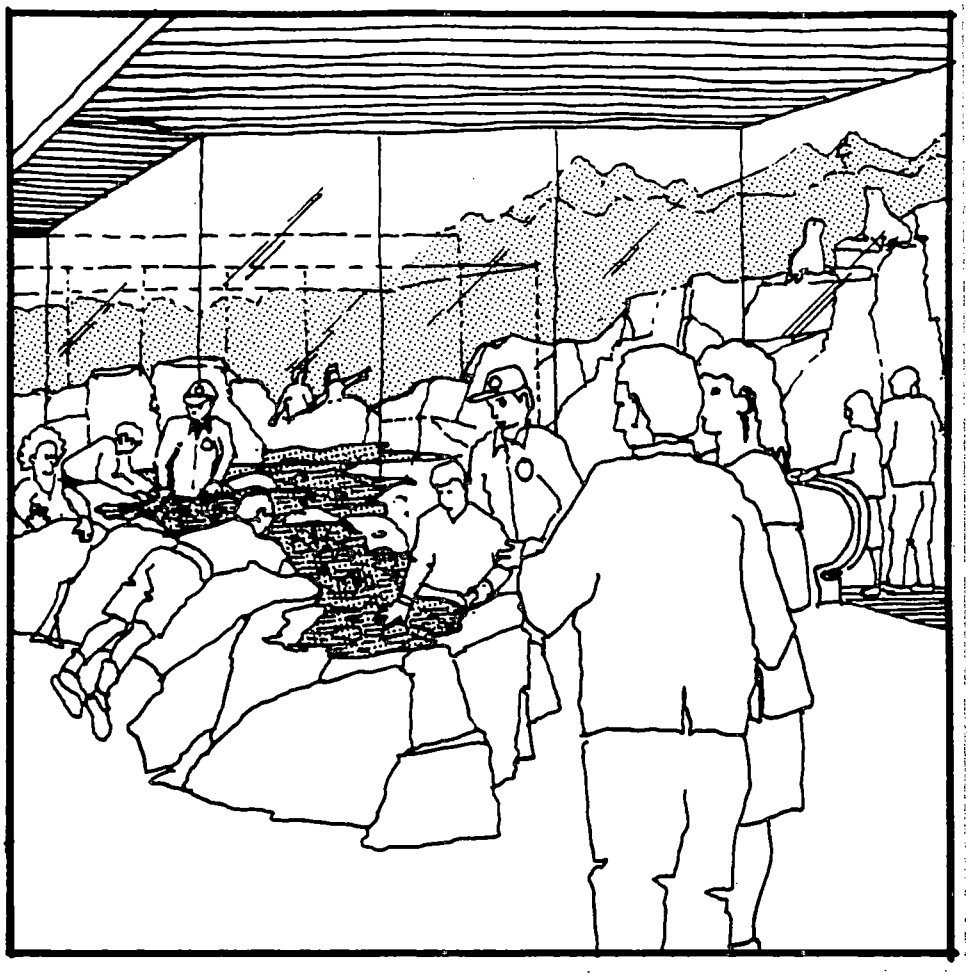
Scientists and animal care staff will be conducting research studies on all of the marine mammals in the rookery. These range from animal physiology to the development and testing of new satellite-linked transmitters.

After passing back through the Indoor Viewing area, visitors will continue walking outdoors on the boardwalk at the opposite end of the Rookery Habitat. Here, they will see playful **Sea Otters** (T.5) in a naturalistic setting. These entertaining animals will be basking on the rocks, swimming through the water, and adroitly eating their prey.



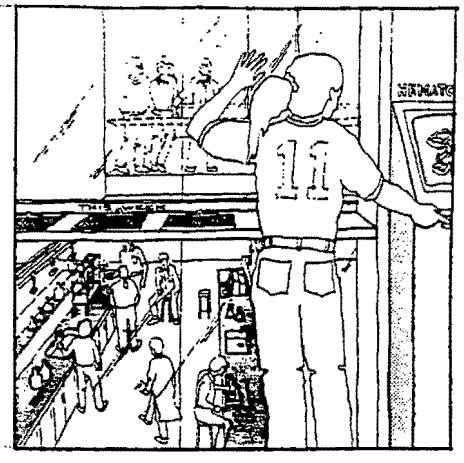
Sketch View #12

The small **Intertidal Touch Pool** (T.6), adjacent to the sea otter habitat, will continue indoors. Visitors can observe the pool's inhabitants outdoors from above and through low acrylic panels. The touch pool contains many tidal species, including some that can be handled and inspected inside the pavilion under a docent's supervision, thus providing another tactile experience for visitors.

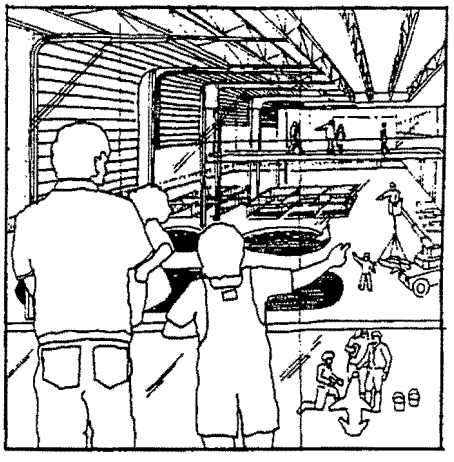


Sketch View #15

Back inside the pavilion, visitors will continue on to **Gallery 6**, which overlooks a second wet lab and the dry lab below. Here, as in Gallery 4, visitors can walk out onto a Pool Viewing Area to observe rehabilitation activities in the outdoor holding tanks. Visitors will use macro video cameras to get an up-close look at a variety of small creatures of the Gulf, including king crab larvae, krill, and plankton. A second camera will have a direct link to a petri dish in the laboratory below. A video monitor will provide a live underwater link to a second holding tank. The hands-on activities in Gallery 4, as in the other Galleries, will be updated to reflect the research projects at ASLC.



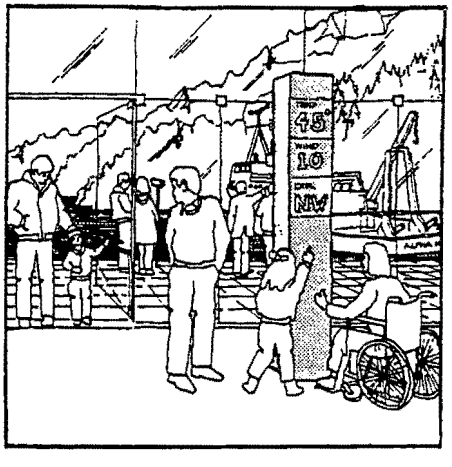
Sketch View #13



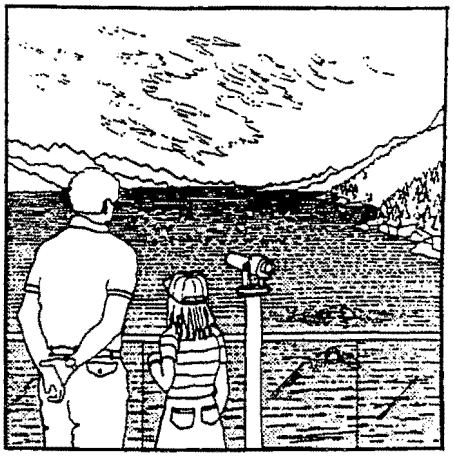
Sketch View #14

Exhibits in **Gallery 7**, which is just opposite the overlook to Resurrection Bay, will highlight sport and commercial fishing in the region, two industries that were catastrophically devastated by the oil spill. Visitors will learn about the fall of fish populations in the Gulf and current research projects, such as the study of the genetic damage that may have been done to pink salmon and herring.

Turning around, visitors will arrive at the **Overlook** at the end of the main gallery, where they will be greeted with a spectacular view of Resurrection Bay and an exterior door for use in good weather. Telescopes will add to the visual enjoyment of the Bay, and a "weather station" will display current information on the tides, wind speed, and temperature.



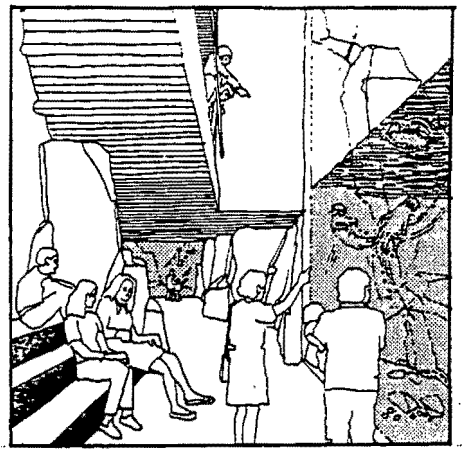
Sketch View #16



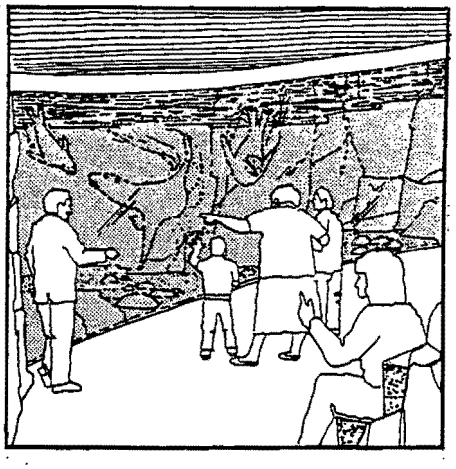
Sketch View #17

After having experienced the South Coastal Habitats above water as well as the interactive galleries, visitors will begin their second journey into the Gulf of Alaska, where all of the rookery species seen earlier will be seen from an underwater perspective. Moving down the escalator from the Upper Gallery, visitors will enter a world that only a very few have seen in this region, until now.

In the **Underwater Gallery** at the ASLC visitors will observe sea otters, sea lions, seals, marine birds, many species of fish and invertebrates all gracefully swimming, feeding, and displaying behaviors not visible from above the surface of the water. Near the escalator, visitors can choose to borrow a "sound wand" to listen to additional interpretive material throughout the Underwater Gallery. Other interpretive devices will include field guides at the many seating areas as well as docents throughout the gallery.



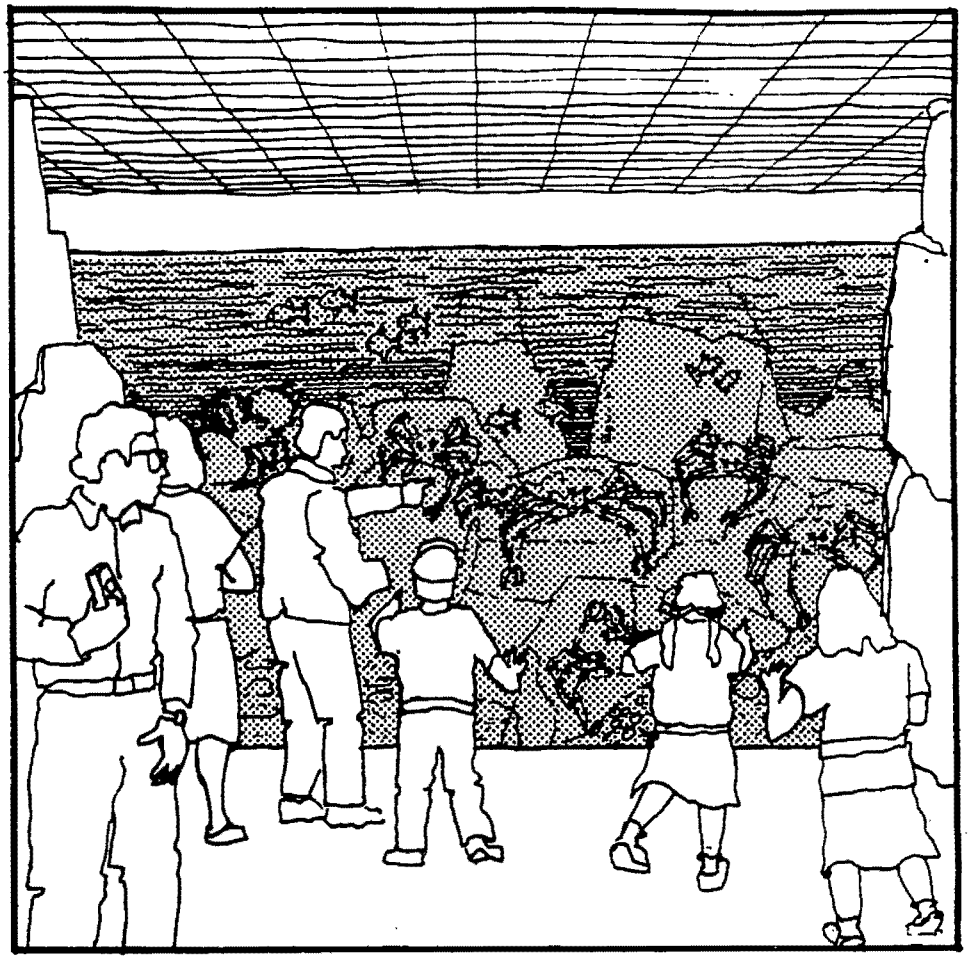
Sketch View #18



Sketch View #21

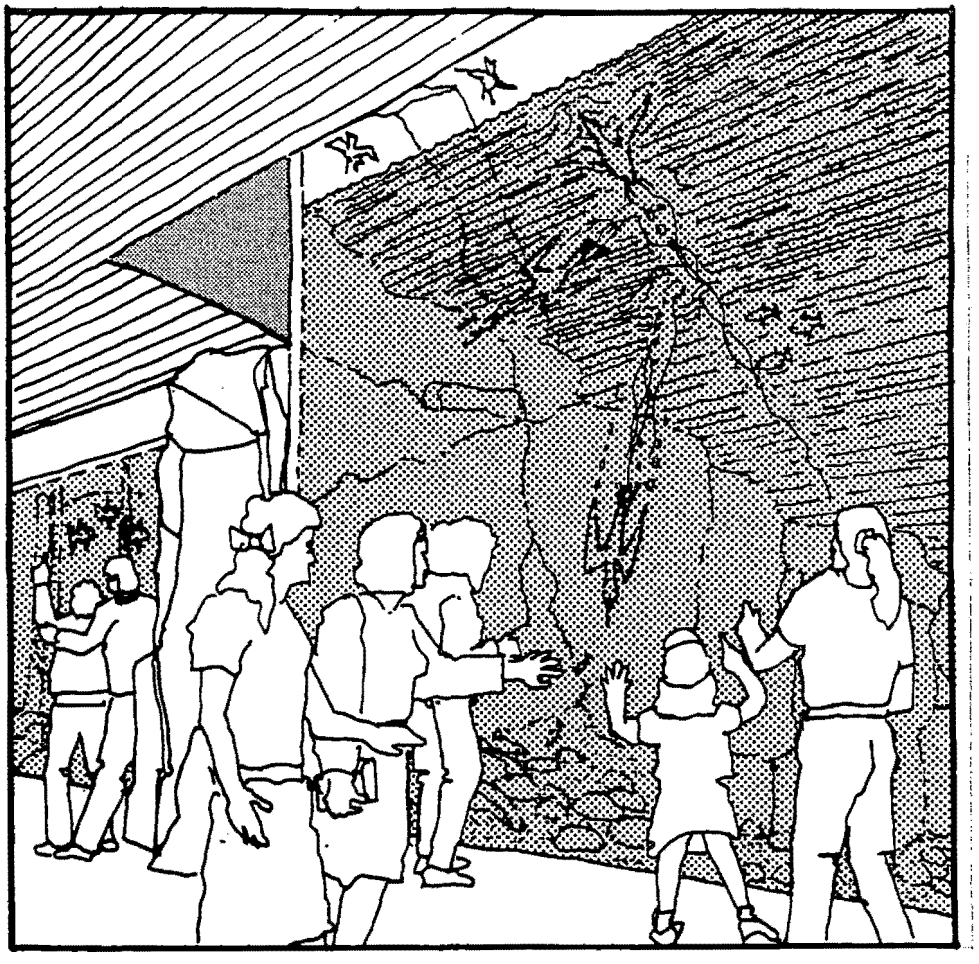
The Sea Otter (T.5) habitat dominates the area at the foot of the escalator. Nearby, a **Rocky Bottom Habitat** (T.7) features benthic fishes, such as sculpin, pricklebacks, rockfish, and eel-like fishes, as well as many of the favorite prey of sea otters, such as crabs, abalone, starfish, and scallops. Other nearby tanks feature many species of **Flat Fish** (T.8) in the region, including halibut, sole, and flounder, **Giant Octopus** (T.9), and a living **Kelp Forest** (T.10). Here, visitors can manipulate an underwater video camera to zoom through the lush underwater forest to find and magnify the many fishes and invertebrates that live and hide among its fronds.

One of the invertebrates most associated with Alaska, the **Alaskan King Crab** (T.11), will be featured in a separate tank. The crabs will be relatively large specimens, typically found in several hundred feet of water off the coast. This deep ocean bottom tank will also feature some large game fish or sharks, swimming above the crabs.



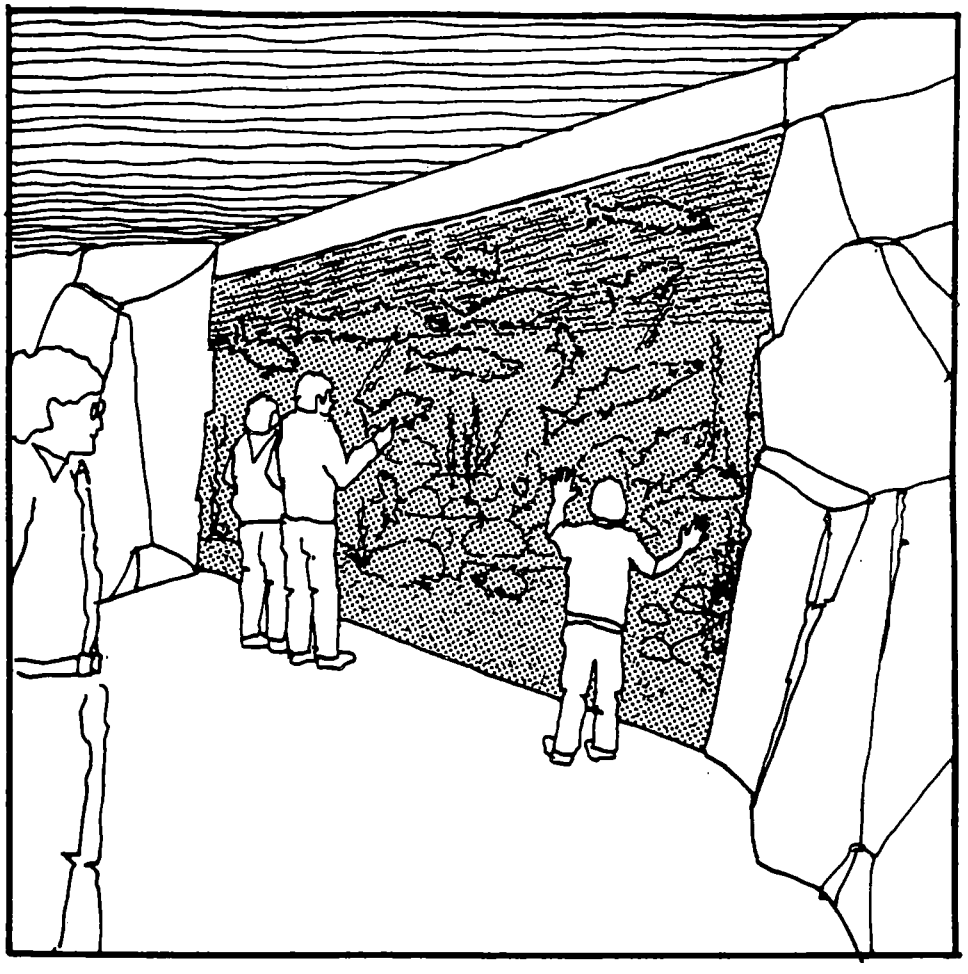
Sketch View #19

A small tank of **Schooling Fish** (T.12), including schooling herring and burrowing sand lances, will be placed adjacent to the Marine Bird tank (T.2). These species represent some of the prey eaten by marine birds. The birds will be fed throughout the day to encourage deep diving in their tank. Visitors will marvel at this spectacular show of birds that "fly" through the water.



Sketch View #20

An ethereal tank with gracefully undulating **Jellyfish** (T.13) will flank the Seal tank (T.4). These interesting invertebrates will mesmerize visitors with their hypnotic dances. Near the end of the Underwater Gallery, visitors will come across the deep portion of the familiar **Freshwater Riparian Stream** (T.14), featuring salmon and trout.



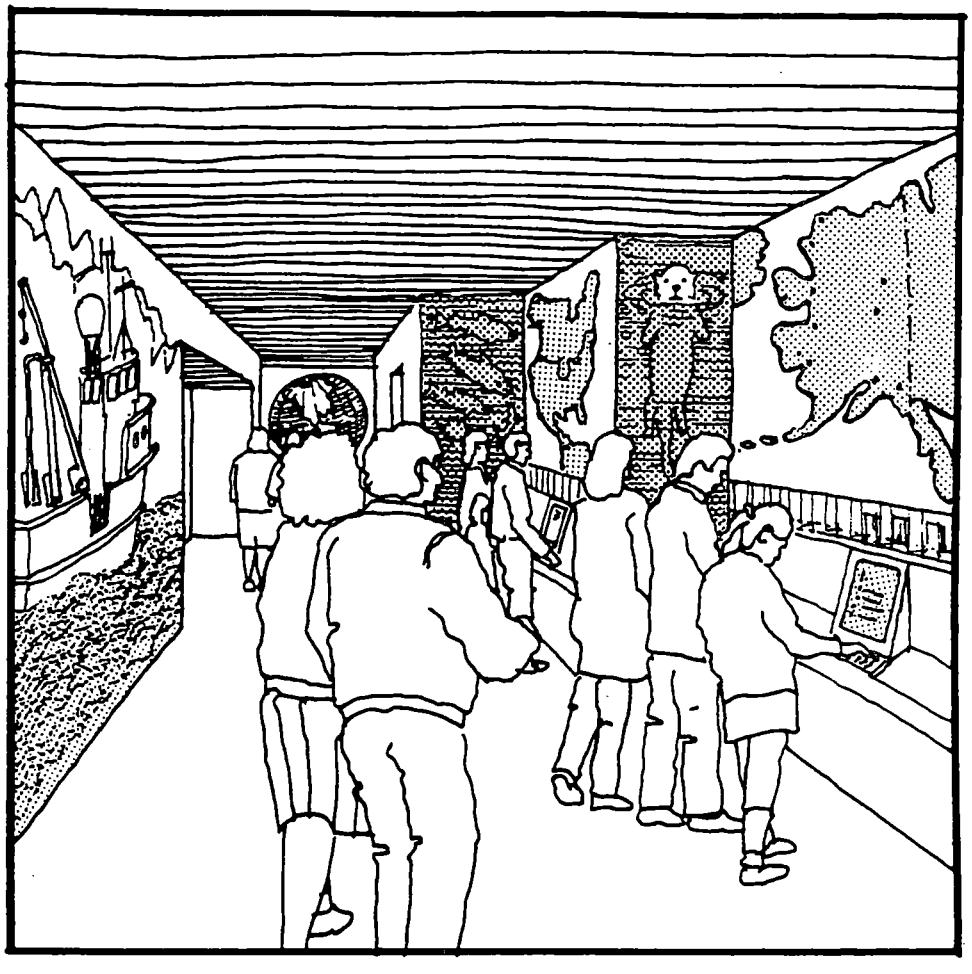
Sketch View #22

The final tank seen underwater will represent the **Gulf of Alaska** (T.15), complete with large game fishes and sharks, such as salmon shark, ratfish, and skate. These species will represent those found in the nutrient-rich waters far off the coast.

Closing Exhibit

As visitors complete their tour of the naturalistic habitats, exhibits in **Gallery 8** will remind them to conserve, to stay informed, and to act to ensure that the pristine natural habitats of Alaska (as well as habitats in other parts of the world) will be sustained for generations to come. Actions that an individual can take towards developing a sustainable lifestyle that is in balance with the natural environment will be presented. Visitors will have the opportunity to pledge to take a step towards a healthier environment by choosing one of several options on a computer screen or by signing up to participate in a future research project.

Upon leaving the exhibits and before entering the Gift Shop, visitors will have a moment to reflect on the natural environment of Alaska and its fragile balance.

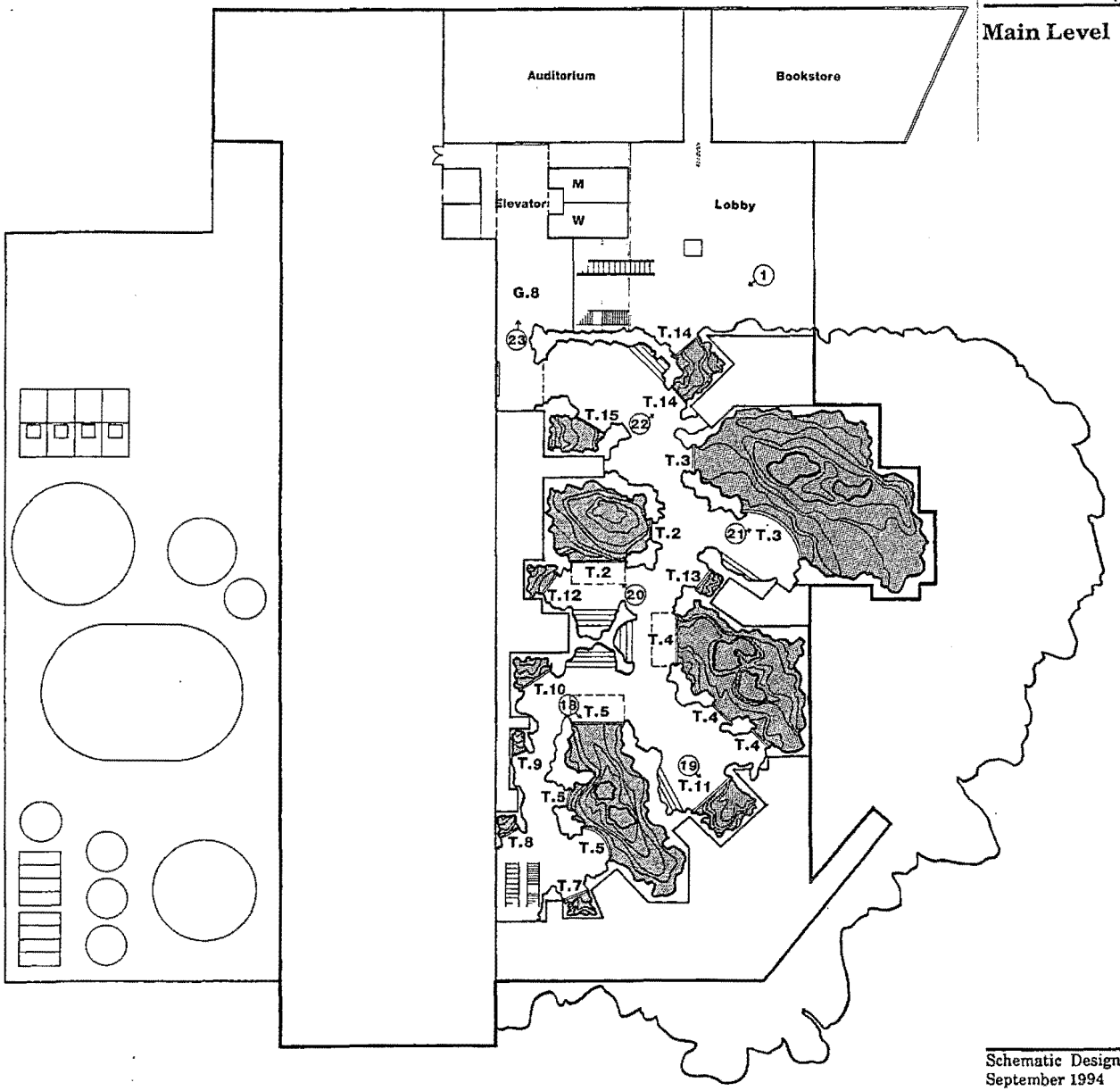


Sketch View #23

Alaska SeaLife Center / Institute of Marine Science
Infrastructure Improvements

Livingston Slone, Inc.
Cambridge Seven Associates, Inc.

Main Level



Main Level

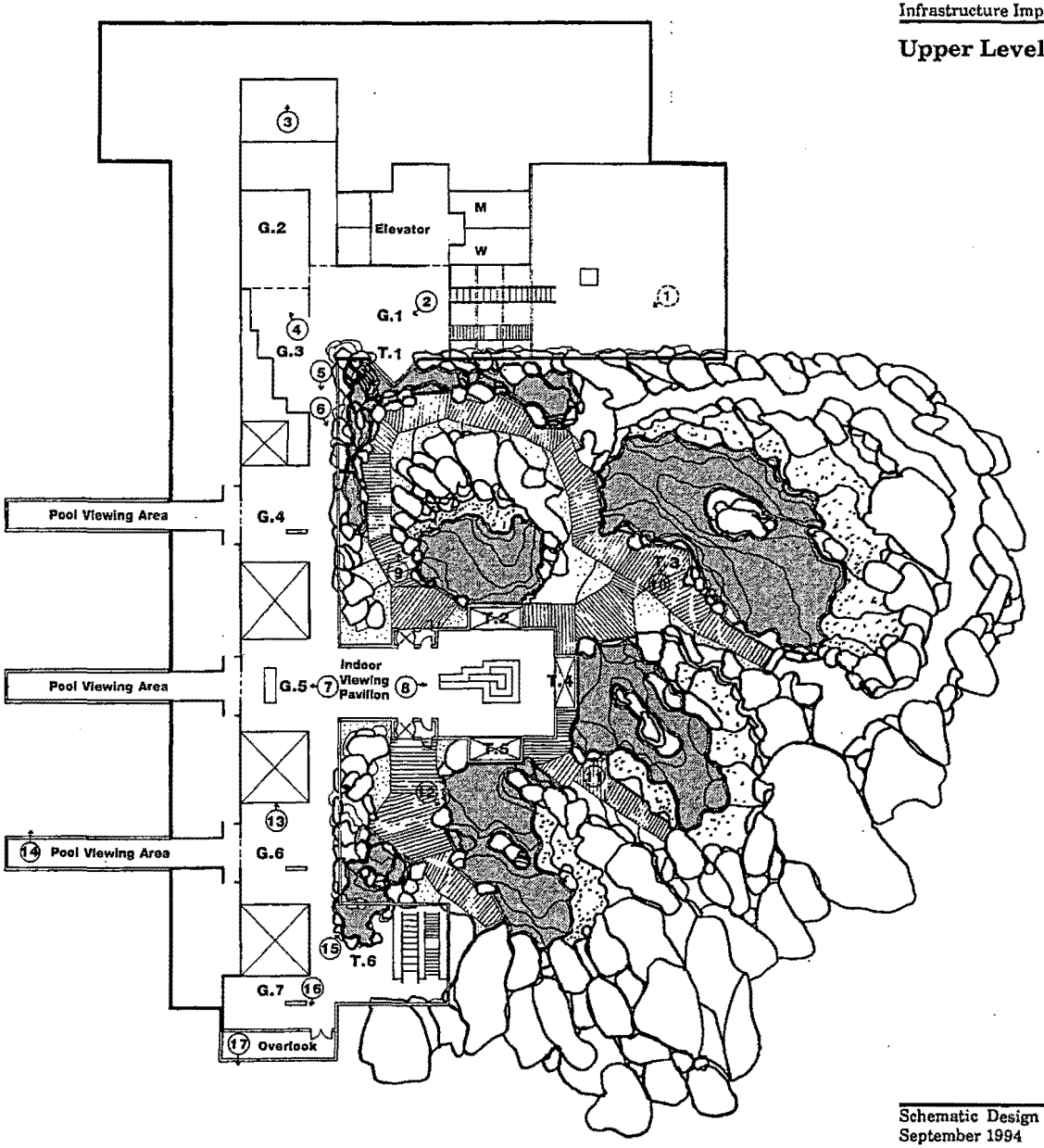
Lobby

Underwater Gallery
- T.2 Marine Birds
- T.3 Steller Sea Lions
- T.4 Seals
- T.5 Sea Otters
- T.7 Rocky Bottom
- T.8 Flat Fish
- T.9 Giant Octopus
- T.10 Kelp Forest
- T.11 King Crabs
- T.12 Schooling Fish
- T.13 Jellyfish
- T.14 Freshwater Stream Sink
- T.15 Gulf of Alaska

Galleries
- G.8 Closing Exhibit

Schematic Design Submittal
September 1994

Upper Level



Upper Level

Galleries
- G.1 Orientation
- G.2 Exxon Valdez Oil Spill
- G.3 Changing Exhibit
- G.4 ASLC Animal Care
- G.5 Visitor Lab Station

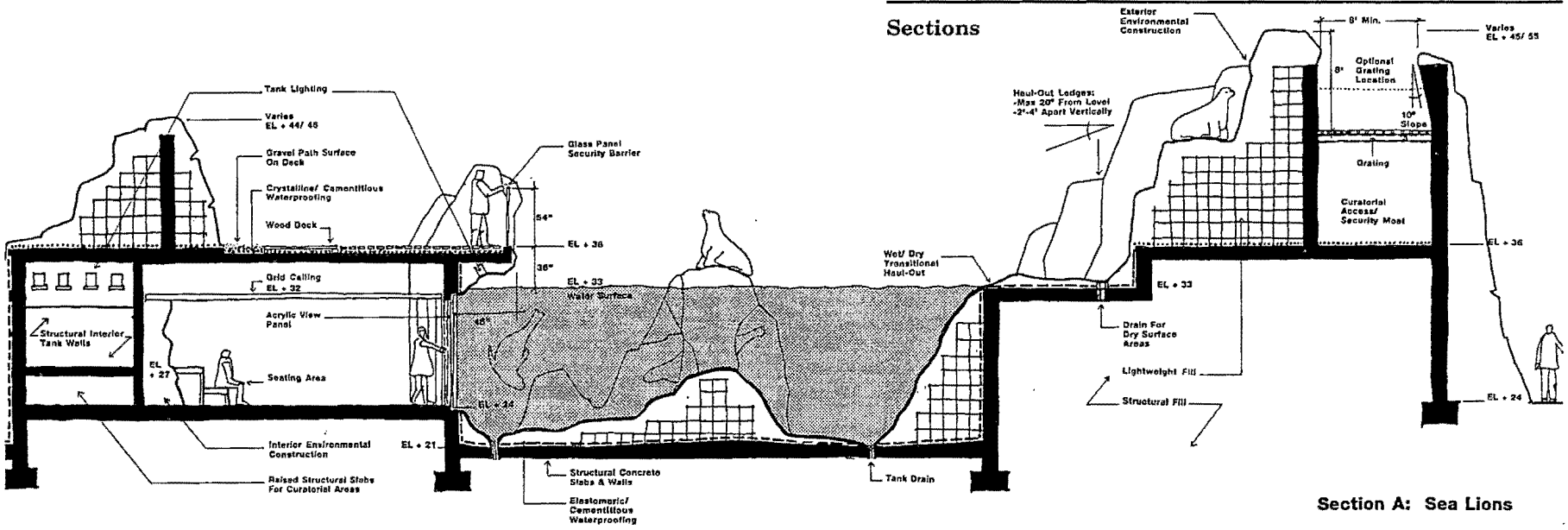
Indoor Viewing Pavilion

Rookery Habitat
- T.1 Freshwater Stream
- T.2 Marine Birds
- T.3 Steller Sea Lions
- T.4 Seals
- T.5 Sea Otters
- T.6 Tide Pool

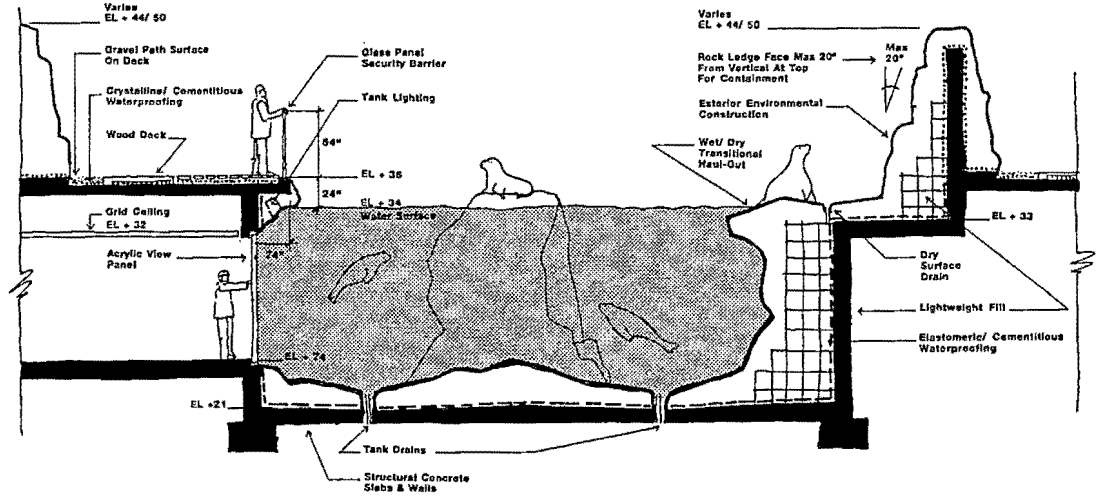
Galleries
- G.6 ASLC Marine Research
- G.7 Commercial and Sport Fishing

Overlook

Sections

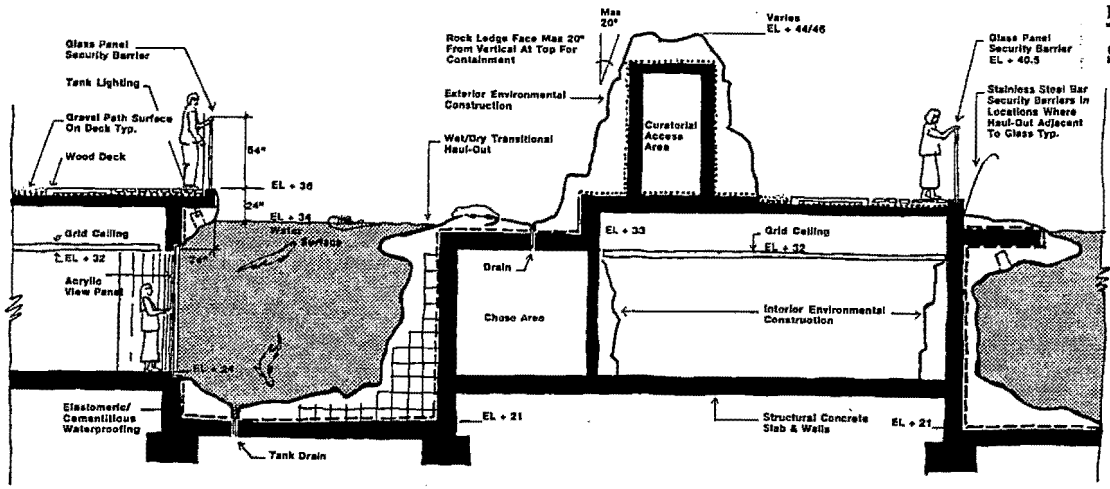


Section A: Sea Lions

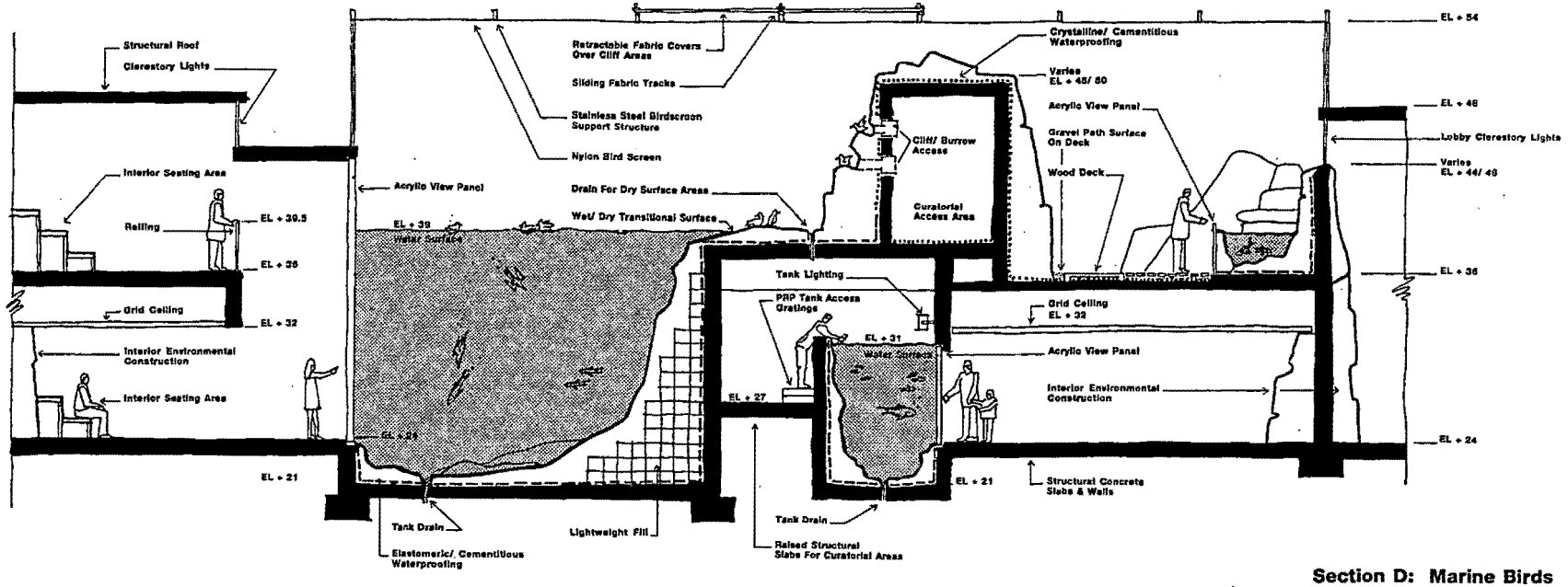


Section B: Seals

Sections



Section C: Sea Otters



Section D: Marine Birds

Educational Gallery Descriptions

G.1 Orientation

G.2 Exxon Valdez Oil Spill

G.3 Changing Exhibit

G.4 ASLC Animal Care

G.5 Visitor Lab Station

Indoor Viewing Pavilion

G.6 ASLC Marine Research

G.7 Commercial and Sport Fishing

Overlook

G.8 Closing Exhibit

Scientific Habitat Descriptions

T.1 Freshwater Stream

T.2 Marine Birds

T.3 Steller Sea Lions

T.4 Seals

T.5 Sea Otters

T.6 Tide Pool

T.7 Rocky Bottom

T.8 Flat Fish

T.9 Giant Octopus

T.10 Kelp Forest

T.11 King Crabs

T.12 Schooling Fish

T.13 Jellyfish

T.14 Freshwater Stream Sink

T.15 Gulf of Alaska

G.1 Orientation

Type: Dry Exhibit
Size: 1,040 sq.ft.
Location: Upper and Main Levels

Exhibit Description
The exhibit will begin in the Lobby and continue in Gallery 1 at the top of the escalator. A montage of painted wall murals and translucent scrims, illuminated by a timed sequence of lights, will draw visitors through the Lobby space and up the escalators to begin their visit. Visitors will actually move through the scrims, continually seeing new images as their perspective changes.

On a large scale, the image and light show in the Lobby will highlight the beauty of Alaska and kinetically contrast the pace of evolutionary change with that of people's impact on the environment.

On the upper level, a series of back-lit photos, artifacts, and a freshwater stream will focus more closely on the Gulf of Alaska to illustrate the complexity and interdependence of its habitats and inhabitants, ranging from deep water marine ecosystems to the coastal rainforest.

Educational Goals
- To introduce visitors to Gulf of Alaska ecology.

- To establish the themes and set the mood for the exhibits that follow.

- To establish that the Gulf of Alaska is one of the richest and most diverse marine ecosystems in the world.

- To promote recognition that like all ecosystems, the Gulf of Alaska is unique unto itself.

- To stress the interdependence of animals, the environment, and people.

- To create an understanding that the region's history is connected to its future.

- To begin to understand the sights and sounds of the natural wild areas of the region.

G.2 Exxon Valdez Oil Spill

Type: Dry Exhibit
Size: 560 sq.ft.
Location: Upper Level

Exhibit Description
The exhibit will concisely present facts about the EVOS—when it happened; how much oil was spilled; how much coastline and water was affected; etc. A large map of North America, for example, will help visitors understand the size of the spill. Its shape will appear on the map and on a tethered acrylic disk, which visitors can move to any part of the map. They'll see that the length of the spill equals the distance between Chicago and New York, or from northern Maine to North Carolina.

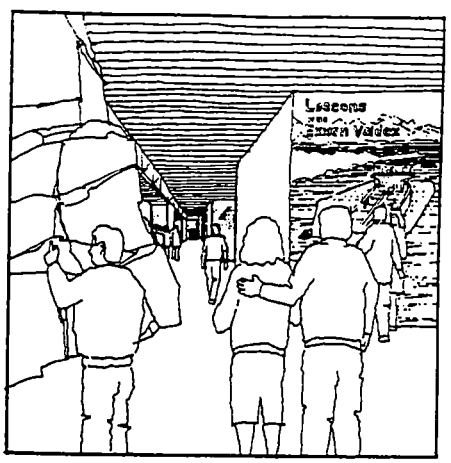
Methods of containment and clean up will be described, using diagrams, photos, and actual artifacts, such as containment booms, cleaning materials, oiled rocks, rags, etc. This may be accompanied by video clips with personal accounts of the clean up.

Educational Goals
- To foster an understanding of the size and scope of the EVOS, that the oil isn't containable and isn't recoverable, that the true extent of the losses will never be known.

- To provide comparisons clearly indicating that a restored habitat is not the same as the habitat prior to the disturbance.

- To illustrate the interdependencies of all organisms in the ecosystem.

- To illustrate how oil from an accidental spill is distributed through the marine environment.



G.3 Changing Exhibit

Type: Dry Exhibit
Size: 700 sq.ft.
Location: Upper Level

Exhibit Description
The Changing Exhibit Gallery will highlight the research projects currently underway at the ASLC. Grant recipients will be required to write a short synopsis of their research in terms that are understandable to the layperson. These abstracts will be revised by the exhibit or education staff and changed into interpretive exhibits, accompanied by graphics or video.

In addition to current research, the effects of oil in the marine environment will be described using photos and text. This will introduce the animals that were most affected by the EVOS: marine mammals, marine birds, and the intertidal zone, all of which represent the primary research subjects of the ASLC.

Some of the equipment used in the labs or in the habitats will also be displayed. For example, telemetry tags may be accompanied by a monitor showing satellite tracking.

The staff will continually update this gallery. The "Current Events" exhibits will rotate with travelling exhibits in this space.

Educational Goals
- To continually introduce new exhibits that in varying ways address the theme that "the oil spill made us realize that we did not know what we had and what we could lose."

- To provide information about oil spill impact on marine mammals, marine birds, and the intertidal zone, all of which are research subjects at the ASLC.

- To introduce the threatened and endangered status of species, directly resulting from the spill.

- To make known new data and interpret, where possible, statistics of wildlife losses and declining populations.

- To introduce the visitor to long-term problems caused by the spill, such as effects on the benthic environment, effects on phytoplankton, and the entrance of hydrocarbons into the food chain.

- To help visitors understand how oil affects fur and feathers.

- To show the effects of contaminated seafood on humans.

- To illustrate contributions to habitat recovery through research.

G.4 ASLC Animal Care

Type: Dry Exhibit
Size: 560 sq.ft.
Location: Upper Level

Exhibit Description
This gallery gives visitors their first glimpse into the Critical Care laboratory on the Main Level. The window will be designed so that scientists can close the view if necessary. Here, visitors can walk outdoors to look down on outdoor holding pens, where recent arrivals will be closely observed.

Copies of observation data sheets will illustrate the amount of time spent with rehabilitating animals. One animal will be used as an example of a typical stay at the ASLC. Visitors can read through the animal's entire history, if they choose. In addition to the data sheets, a series of chronological photos will show the animal's progression.

Up to two live video hook-ups will be displayed. One will be an underwater view into the outdoor holding tank, and the other, which may be turned off at the scientists' discretion, will show the activities in the Critical Care Lab below.

Additional interpretive material will include maps that show concentrations of animal deaths due to the oil spill, theories on why strandings occur, and steps one should take if one finds a stranded marine mammal.

Educational Goals
- To foster an understanding of animal behavior, and the effects on behavior of various situations.

- To establish a baseline of information about the potential rehabilitation of the inhabitants of the Alaskan Southern Coastal Habitat.

- To inform visitors what to do if they encounter a stranded animal.

- To foster consideration of and understanding of where and why marine mammal populations are declining.

- To introduce visitors to the operations and the importance of the critical care component of the ASLC.

G.5 Visitor Lab Station

Type: Dry Exhibit
Size: 520 sq.ft.
Location: Upper Level

Exhibit Description
The Visitor Lab Station is located between two large viewing windows down to a Wet Laboratory and a Dry Laboratory on the Main Level. In one or in both of the labs, a researcher will be designated the "Scientist of the Day," and will have a microphone hook-up with the visitors. The scientist will answer questions about his or her research.

Meanwhile, up in the Visitor Lab Station, visitors will become "scientists" as they observe, explore, develop theories, and test their theories, with the help of one or more docents. This will be a low-tech, hands-on approach to scientific methods and some of the research that is going on at the ASLC. Visitors will be invited to touch, to smell, to look, and to listen to various artifacts and organisms.

For example, visitors will look through large microscopes to learn about water quality or to see the difference between wet, oily, and dry feathers and furs. In addition, they will be able to touch real examples of clean and soiled marine bird feathers and of seal and sea otter fur.

Docents will also have a number of small organisms that visitors can touch and ask questions about.

Educational Goals
- To offer visitors an understanding of questions scientists ask and why.

- To provide information about some of the techniques that are used in scientific research.

- To provide opportunities for visitors to interact directly with a trained docent, naturalist, or scientist, with reference to research projects.

- To offer visitors a chance to participate, in some instances, with ongoing scientific experiments.

- To immerse visitors in the research taking place at the ASLC.

- To promote understanding of the life of a research scientist.

Indoor Viewing Pavilion

Type: Dry Exhibit
Size: 1,484 sq.ft.
Location: Upper Level

Exhibit Description
The Indoor Viewing Pavilion will enable visitors to view the animals and scientists in the Rookery Habitat without venturing outdoors, especially in bad weather. Visitors can rest at the large, central seating area and watch the seals, sea otters, and marine birds.

For a closer view and more interpretive information, visitors will stand at the two-level viewing windows, where stationary "field note stations" will present information on animal behavior as well as the types of research going on at the current moment. At the windows, visitors can also hear marine mammal sounds and listen to additional information about the animals.

When visitors do venture outdoors, they will pick up the portable "field guides" at the revolving doors, which will contain identification information as well as information about reclamation and recovery rates of injured animals.

Educational Goals
- To provide opportunities for the public to observe animal behaviors such as diving and feeding, without disturbing the animals.

- To provide opportunities for the public to watch scientists conduct their studies with the animals in the Rookery Habitat.

- To assist visitors to identify and understand the various characteristics and idiosyncrasies of each animal species in the Outdoor Rookery.

- To provide information about the reclamation and recovery of injured animal groups and of individuals at the ASLC.

G.6 ASLC Marine Research

Type: Dry Exhibit
Size: 560 sq.ft.
Location: Upper Level

Exhibit Description
In this gallery, visitors will look down into a second Wet Laboratory on the Main Level. They will also continue using the scientific methods introduced in Gallery 5, but some of the equipment will be more high-tech. For example, using a macro video camera that is mounted above a "lazy susan" of petri dishes, visitors can look at many of the micro-organisms at the bottom of the food web, including phytoplankton, zooplankton, king crab larvae, etc. The organisms will be shown on a nearby video monitor.

As in Gallery 4, visitors can exit out onto a viewing platform and watch recuperating animals in the holding tanks below. An underwater video hook-up will be broadcast in this gallery. Another video may "look over the shoulder" of one of the scientists in the wet lab that is below this gallery.

Educational Goals
- To encourage visitors to pose questions based on the behaviors or characteristics of the organisms they are observing.

- To promote understanding that scientific research is a long process, and of how the findings of research will be used.

- To explain the fundamental importance of microorganisms as an integral part of the Gulf of Alaska ecosystem.

- To provide opportunities for visitor interaction with the research components and immersion in the research process.

- To promote understanding of the interdependencies of organisms on all levels of the ecosystem, including humans.

G.7 Commercial and Sport Fishing

Type: Dry Exhibit
Size: 480 sq.ft.
Location: Upper Level

Exhibit Description
This gallery will provide up-to-date information on the commercial and sport fishing industries, with particular attention to theories on pink salmon mortalities and decreases in the herring stock.

Interpretive graphics will describe the research that biologists at the ASLC are conducting regarding genetic damage done to pink salmon and herring. In addition, graphics and artifacts will highlight the fish hatchery operations in the area.

Educational Goals
- To promote understanding of the food web and the interrelationships of organisms.

- To explain how natural resources are important to humans.

- To foster understanding of the lasting effects of the oil spill on the ecosystem.

- To introduce a transition from macro thinking to "the big picture."

- To further reinforce the main theme that before the spill "we did not know what we had and what we could lose."

Overlook

Type: Dry Exhibit
Size: 256 sq.ft.
Location: Upper Level

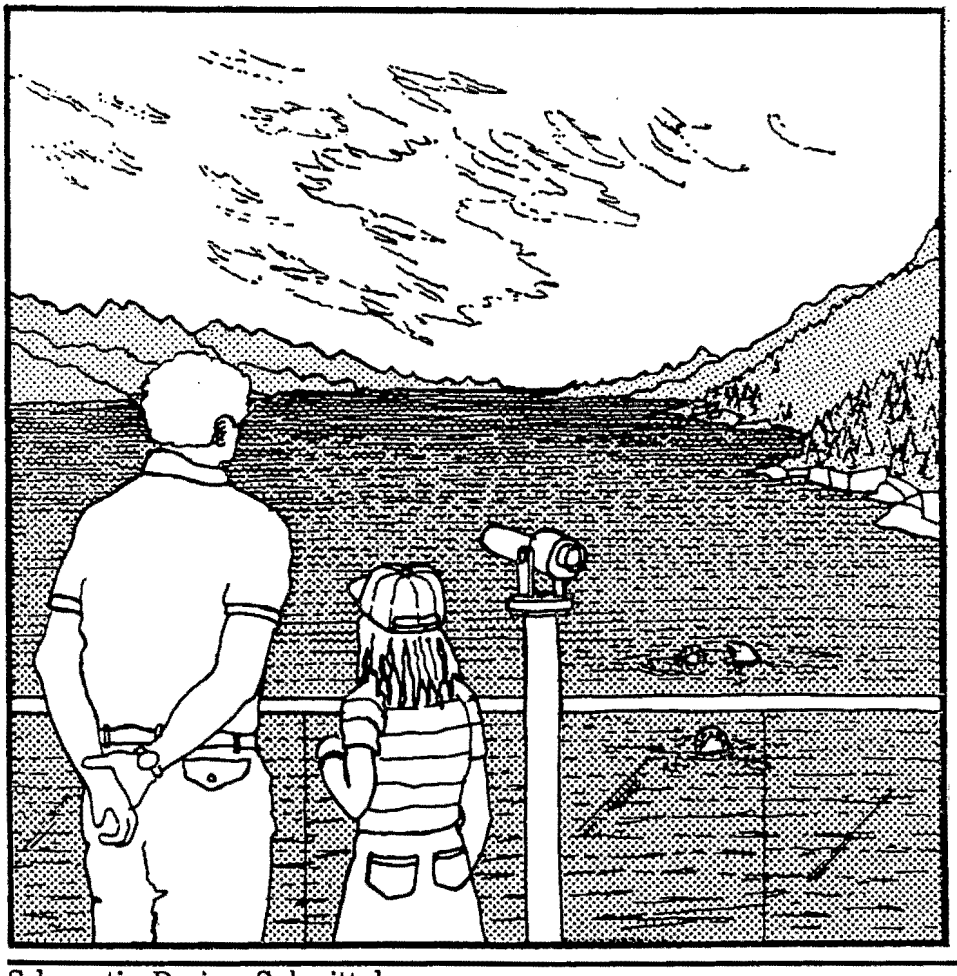
Exhibit Description
A monitor will display current weather information for Resurrection Bay, including wind direction and speed, air and water temperatures, as well as tides. The monitor may alternate this information with a 3-D view of the Bay's basin, showing thermoclines.

Visitors will be able to look through telescopes to view different locations along the Bay.

Educational Goals
- To provide the public with an opportunity to observe ocean dynamics and geological formations of the Gulf of Alaska.

- To correlate statistical data on tides and weather with observed conditions.

- To provide, where possible, real-time monitoring of marine mammals and birds in the wild.



G.8 Closing Exhibit

Type: Dry Exhibit
Size: 952 sq.ft.
Location: Main Level

Exhibit Description
The closing gallery will encourage visitors to retain what they have learned during their stay at the ASLC. A thoughtful quote regarding the beauty of Alaska will appear at the beginning of the gallery. Once inside, a series of graphics, artifacts, and computers will suggest steps that visitors can take towards developing a sustainable lifestyle: 1) conserve; 2) stay informed; and then 3) act.

Computers will offer such options for action as: using less oil by driving less often, conserving water, forest, or soil resources, avoiding pollution to fragile habitats, or signing up to work as a volunteer at the ASLC. The computers may tally up people's choices and give feedback on individual actions. The computers can also be used by the ASLC staff to study visitor input.

The gallery will end with a second thoughtful quote. A large backlit photo will lead visitors to the end of the hall and out towards the Lobby, where they had originally begun their tour.

Educational Goals
- To promote understanding that everyone of us has a role to play in developing a sustainable lifestyle.

- To clearly indicate that the ASLC is working toward an understanding of the Alaskan environment.

- To foster an awareness of the ecosystem and its fragility.

- To encourage an understanding of terms such as sustainable use and sustainable yield.

- To promote environmental stewardship.

T.1 Freshwater Stream

Type: Habitat
Size: 8,696 gallons
Location: Upper Level

Exhibit Description
Above- and below-water views of this habitat will be seen in the Orientation Exhibit (G.1) as well as in the Outdoor Rookery. Glazing along the hall between Galleries 3 and 4 will also provide views into the freshwater stream as well as other portions of the Rookery.

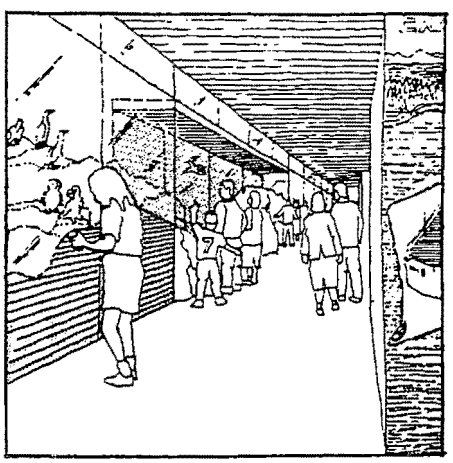
Species identification and other information will appear on small totems along the pedestrian boardwalk in the Outdoor Rookery, and for additional information, visitors will be able to refer to hand-held "field guides," which they will have picked up before venturing outdoors. Docents and researchers with the animals will provide further information.

Habitat Description
This habitat represents a narrow stream on its way to Resurrection Bay. The stream is filled with juvenile anadromous fish as well as species that spend 100% of their lives in freshwater. The stream is surrounded by rocks that are covered with lichen, mosses, and wildflowers. Its surface is open to the air, and visitors can put their hands into the water if they choose to do so.

Preliminary Species List

Dolly Varden fingerlings	*Salvelinus malma*
Coho Salmon fingerlings	*Oncorhynchus kisutch*
Pink Salmon fingerlings	*Oncorhynchus gorbuscha*
Chinook Salmon fingerlings	*Oncorhynchus tshawytscha*
Chum Salmon fingerlings	*Oncorhynchus keta*
Sockeye Salmon fingerlings	*Oncorhynchus nerka*
Steelhead fingerlings	*Salmo gairdneri*

Cutthroat Trout fingerlings and adults
Threespine Stickleback fingerlings and adults



T.2 Marine Birds

Type: Habitat
Size: 200,000 gallons
Location: Upper Level and Main Level

Exhibit Description
Views into this habitat occur on both levels of the ASLC. Above-water viewing takes place on the Upper Level in the Indoor Viewing Pavilion and the Outdoor Rookery, and below-water viewing occurs in the Underwater Gallery on the Main Level.

In the Outdoor Rookery, interpretive graphics will appear on small totems along the pedestrian boardwalk, and visitors will refer to hand-held "field guides," for species identifications and other information. Docents and scientists will provide further information to visitors.

Downstairs, interpretive graphics will appear above the viewing windows, describing the birds' diving and eating behaviors. Multiple-page field guides will be installed near the seating area adjacent to the habitat, and the hand-held audio system will provide additional interpretive information.

Scientific Description
The marine bird research program will conduct a wide range of projects including captive feeding/energetics, health status and disease studies, reproduction biology, physiology, and ecosystem modeling. Behavioral studies can be undertaken in the habitat to examine diving and food selection/ handling characteristics. The habitat can also be used to develop and test telemetry equipment prior to implant. Additionally, studies will examine the impact of new instruments on the natural behavior of marine birds.

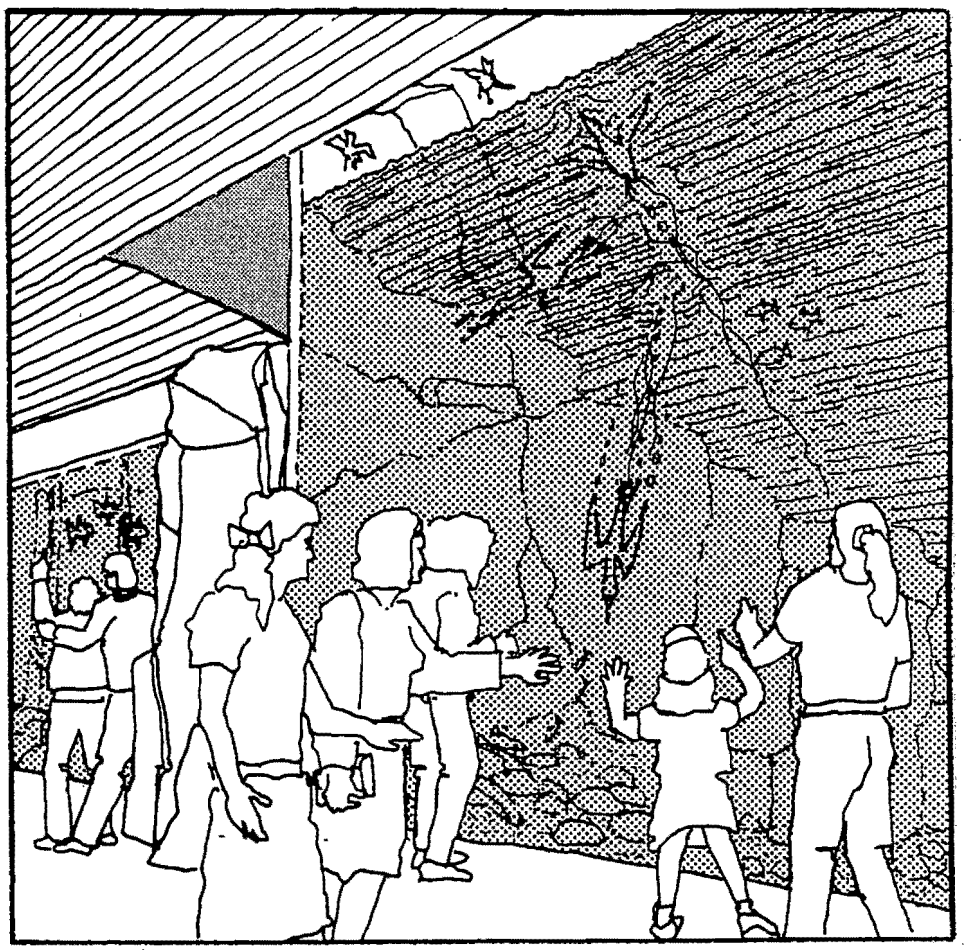
Habitat Description
This habitat is one part of the seemingly continuous Rookery Habitat that is comprised of tanks T.2 through T.5. All represent the coastline just outside Resurrection Bay, where giant granite cliffs and boulders rise out of the sea, creating some of the world's richest rookeries. Numerous shallow cliff edges provide nesting spots for marine birds.

Each of the Rookery Habitats features a separate, deep water pool, where animals will dive and swim among the underwater boulders and crevices.

T.2 Marine Birds

Preliminary Species List

Common Murres	*Uria aalge*
Thick-billed Murres	*Uria lomvia*
Marbled Murrelets	*Brachyamphus marmoratus*
Harlequin Ducks	*Histrionicus histrionicus*
Horned Puffins	*Fratercula corniculata*
Tufted Puffins	*Fratercula cirrhata*
Parakeet Auklets	*Cyclorrhynchus psittacula*
Rhinoceros Auklets	*Cerorhinca monocerata*
Pigeon Guillemots	*Cepphus columba*
Black-legged Kittiwakes	*Rissa tridactyla*
Kittlitz's Murrelet	*Brachyamphus brevirostris*



T.3 Steller Sea Lions

Type: Habitat
Size: 300,000 gallons
Location: Upper Level and Main Level

Exhibit Description
This habitat extends to both levels of the ASLC. In the Outdoor Rookery, small totems will provide a location for interpretive graphics along the pedestrian boardwalk. Hand-held "field guides" will provide species identification and other information.

Interpretive graphics describing Steller sea lion behavior and some of the historic and modern threats to their existence will appear in the Underwater Gallery above the viewing windows to T.3. A field note station and the hand-held audio system will provide additional information about these threatened animals.

Scientific Description
Steller sea lion populations have experienced a severe decline over the last 30 years in the northern Gulf of Alaska. Marine mammal research projects at ASLC could include captive feeding/energetics, hydrodynamics, health status and disease studies, reproduction biology, physiology, behavior, testing of telemetry equipment, and ecosystem modeling and data management. Steller sea lions could also be tested for a wide variety of specific blood indices of health and how these factors change over time with various handling regimes. Immobilization studies could be done on animals in small research tanks.

Habitat Description
The Outdoor Rookery, begun with the marine birds in T.2, continues in the two-level, Steller sea lion habitat. Here, the sea lions can climb up and bask on relatively steep rockwork.

Preliminary Species List
Steller Sea Lions *Eumetopias jubatus*

T.4 Seals

Type: Habitat
Size: 250,000 gallons
Location: Upper Level and Main Level

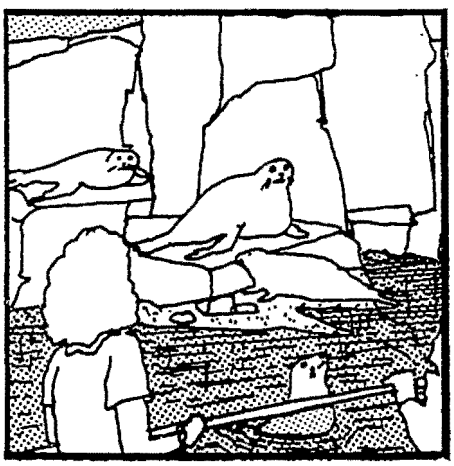
Exhibit Description
Views into this habitat occur on both levels of the ASLC. In the Outdoor Rookery, interpretive information will be displayed on hand-held "field guides" and on the small totems located along the pedestrian boardwalk.

Downstairs above the viewing windows, interpretive graphics will describe harbor seal behavior. Field note stations and the hand-held audio system will provide additional information.

Scientific Description
Although harbor seal populations have declined precipitously since 1984, the EVOS caused additional declines. A better understanding of the causes of these declines is needed to determine the actions needed for recovery. In addition to the general marine mammal research projects described under T.3, the blood chemistry and stress proteins, and hormone status of harbor seals could be tested. Feeding studies could be undertaken to look at the relationships between types and quantities of food and whole body energy demands of animals. Hydrodynamics and diving physiology could be analyzed, and telemetry equipment could be tested.

Habitat Description
The deep water pool for the seals, which is a continuation of the Rookery Habitat, is adjacent to, but separated from, the Steller Sea Lion's habitat. Gently sloping haul-out areas differentiate the seals' habitat from the sea lions'.

Preliminary Species List
Harbor Seals *Phoca vitulina*



T.5 Sea Otters

Type: Habitat
Size: 150,000 gallons
Location: Upper Level and Main Level

Exhibit Description
The sea otters can be seen on both levels of the ASLC. In the Outdoor Rookery, interpretive graphics will appear on small totems along the pedestrian boardwalk. Visitors will also refer to hand-held "field guides" for species identifications.

Downstairs, above the viewing windows, interpretive graphics, field notes, and the hand-held audio system will describe sea otter behavior and some of the historic and modern threats to their existence.

Scientific Description
Sea otters were the most abundant marine animal in the path of the EVOS and were particularly vulnerable to its effects. Little or no evidence of their recovery has been detected thus far. In addition to the marine mammal research programs outlined for T.3, blood chemistry research done on captive animals would be compared to those of wild animal samples taken from inside and outside the EVOS region. Data from morphometric examinations of animals over time and development will be used to understand how an animal's mass and size can be used to determine health condition relative to fatness or malnutrition.

Habitat Description
The sea otter pool is the last habitat in the seemingly continuous Outdoor Rookery, which represents the coastline just outside Resurrection Bay.

Preliminary Species List
Sea Otters *Enhydra lutris*

T.6 Tide Pool

Type: Habitat
Size: 4,410 gallons
Location: Upper Level

Exhibit Description
In the Outdoor Rookery Habitat, the nearby totem will provide only a small amount of explanatory material. For a full interpretation of the tidepool, visitors must stop at the indoor portion of this exhibit. Here, a docent will give information and answer questions about the tidepool and intertidal zone, while supervising careful handling of some of the species in the tank.

Habitat Description
Visitors will see a naturalistic tidepool, which represents a pristine intertidal zone as it would have appeared before the EVOS.

Preliminary Species List

Juvenile Red Irish Lord	*Hemilepidotus hemilepidotus*
Juvenile Pacific Staghorn Sculpin	*Leptocottus armatus*
Juvenile Eyeshade Sculpin	*Nautichthys pribilovius*
Juvenile Northern Sculpin	*Icelinus borealis*
Knobless Six-rayed Sea Star	*Leptasterias hexactis*
Aleutian Sea Star	*Leptasterias hylodes*
Rose Sea Star	*Crossaster papposus*
Tumid Sea Star	*Henricia tumida*
Ubiquitous Brittle Star	*Ophiopholis aculeata*
Notched Brittle Star	*Ophiura sarsi*
Fragile Urchin	*Allocentrotus fragilis*
Greenspined Sand Dollar	*Echinarachnius parma*
Widehand Hermit Crab	*Elassochirus tenuimanus*
Purple Hermit Crab	*Elassochirus cavimanus*
Red Hermit Crab	*Elassochirus gilli*
Aleutian Hermit Crab	*Pagurus aleuticus*
Alaskan Hermit Crab	*Pagurus ochotensis*
Bluespined Hermit Crab	*Pagurus kennerlyi*
Hairy Hermit Crab	*Pagurus capillatus*
Dungeness Crab	*Cancer magister*
Helmet Crab	*Telmessus cheiragonus*
Blue Mussels	*Mytilus edulis*

T.7 Rocky Bottom

Type: Habitat
Size: 2,843 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will include species identifications as well as a short description of the ecology of the rocky reef. More in-depth information about the interrelationships of the organisms will be provided by the hand-held audio system.

Habitat Description
This habitat is the first that visitors will see after their descent to the lower level via escalator. The habitat, a recreation of a rocky reef in the Gulf of Alaska, will be teeming with life. Here, sponges, anemones, sea stars, and other invertebrates will cover the reef, which will be home to many species of rockfish, sculpin, and pricklebacks.

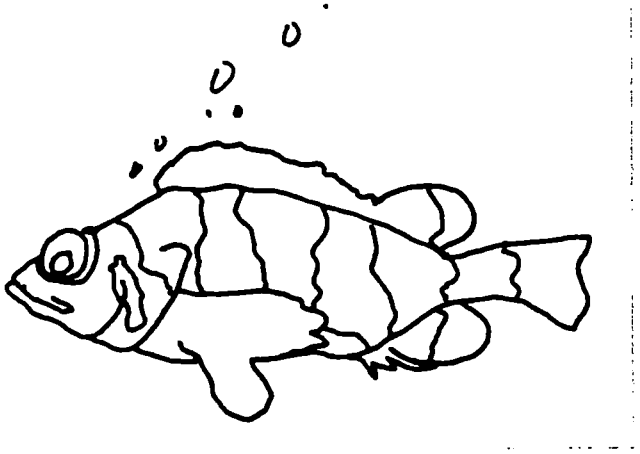
Preliminary Species List

Lingcod	*Ophiodon elongatus*
Yelloweye Rockfish	*Sebastes ruberrimus*
Rougheye Rockfish	*Sebastes aleutianus*
Darkblotched Rockfish	*Sebastes crameri*
China Rockfish	*Sebastes nebulosus*
Tiger Rockfish	*Sebastes nigrocinctus*
Dark Dusky Rockfish	*Sebastes ciliatus*
Bigmouth Sculpin	*Hemitripterus bolini*
Crested Sculpin	*Blepsias bilobus*
Silverspotted Sculpin	*Blepsias cirrhosus*
Spinyhead Sculpin	*Dasycottus setiger*
Darkfin Sculpin	*Malacocottus zonurus*
Yellow Irish Lord	*Hemilepidotus jordani*
Red Irish Lord	*Hemilepidotus hemilepidotus*
Buffalo Sculpin	*Enophrys bison*
Plain Sculpin	*Myoxocephalus jaok*
Great Sculpin	*Myoxocephalus polyacanthocephalus*
Pacific Staghorn Sculpin	*Leptocottus armatus*
Fourhorn Sculpin	*Myoxocephalus quadricornis*
Wolf-eel	*Anarrhichthys ocellatus*
Decorated Warbonnet	*Chirolophis decoratus*
Longsnout Prickleback	*Lumpenella longirostris*
Snake Prickleback	*Lumpenus sagitta*
Whitebarred Prickleback	*Poroclinus rothrocki*
Daubed Shanny	*Lumpenus maculatus*
Slender Eelblenny	*Lumpenus fabricii*
Cloud Sponges	*Aphrocallistes vastus*
Sea Raspberry	*Eunephtya fruticosa*
Red Tree Coral	*Primnoa willeyi*
Sea Football	*Cucumaria fallax*

T.7 Rocky Bottom

Preliminary Species List

Slender Sea Cucumber	*Bathyplotes sp.*
Redscaled Sea Cucumber	*Psolus sp.*
Green Urchins	*Strongylocentrotus droebachiensis*
Twentyarm Sea Star	*Pycnopodia helianthoides*
Majestic Sea Star	*Pedicellaster magister*
Knobless Six-rayed Sea Star	*Leptasterias polaris*
Mottled Sea Star	*Evasterias troschelii*
Redbanded Sea Star	*Orthasterias koehleri*
Grooved Sea Star	*Crossaster borealis*
Sun Sea Star	*Solaster stimpsoni*
Blood Sea Star	*Henricia leviuscula*
Pincushion Sea Star	*Diplopteraster multipes*
Cushion Sea Star	*Pteraster tesselatus*
Northern Sea Star	*Dipsacaster borealis*
Red Bat Sea Star	*Ceramaster japonicus*
Weathervane Scallops	*Pecten caurinus*
Anemone Species	
Shrimp Species	
Crab Species	



T.8 Flat Fish

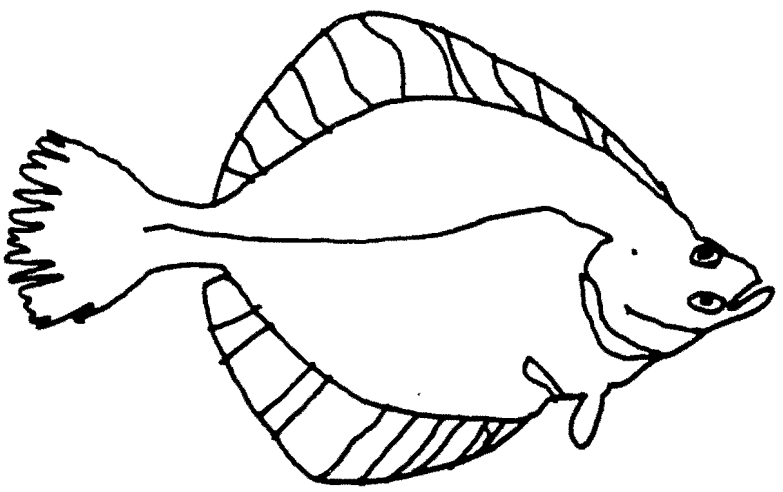
Type: Habitat
Size: 1,795 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will diagram how the lower eye of a flatfish moves around to the upper side of the fish. Additional information will be provided by the hand-held audio system.

Habitat Description
A large, open, sandy bottom habitat.

Preliminary Species List

Pacific Halibut	*Hippoglossus stenolepis*
Greenland Turbot	*Reinhardtius hippoglossoides*
Arrowtooth Flounder	*Atheresthes stomias*
Flathead Sole	*Hippoglossoides elassodon*
Yellowfin Sole	*Limanda aspera*
Rock Sole	*Lepidopsetta bilineata*
Butter Sole	*Isopsetta isolepis*
Starry Flounder	*Platichthys stellatus*
Rex Sole	*Glyptocephalus zachirus*
Dover Sole	*Microstomus pacificus*
Alaska Plaice	*Pleuronectes quadritubercularus*



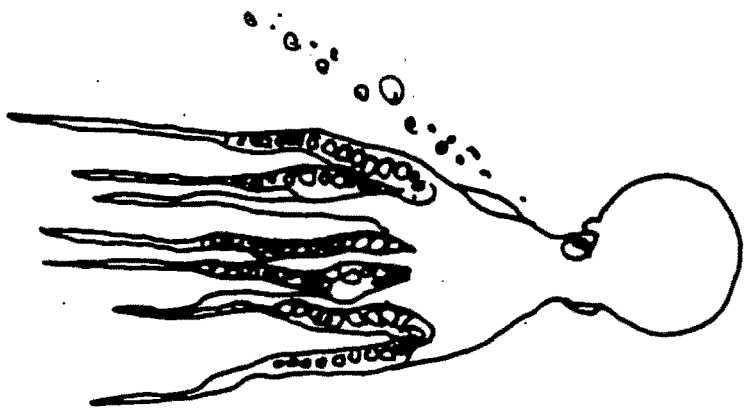
T.9 Giant Octopus

Type: Habitat
Size: 1,356 gallons
Location: Main Level

Exhibit Description
An identification panel above the viewing window displays information about the giant octopus, and the hand-held audio systems will provide additional interpretive material.

Habitat Description
The habitat is open, with a few rocks. The landscape is minimal so the giant octopus cannot hide. Most of the time, the octopus will be in full view, attached to the front viewing window.

Preliminary Species List
Giant Pacific Octopus *Octopus dofleini*



T.10 Kelp Forest

Type: Habitat
Size: 3,815 gallons
Location: Main Level

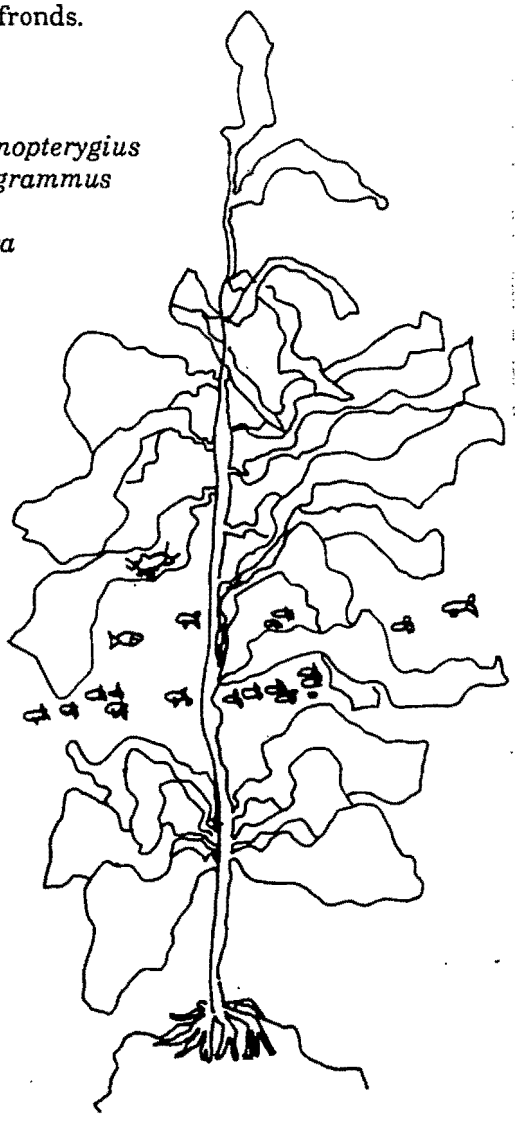
Exhibit Description
The exhibit includes an underwater video camera that visitors can move up and down, zoom, and focus on small animals in the kelp forest. The operator uses a small monitor to focus, while other visitors watch the scene on a separate, larger monitor, mounted next to the tank.

Many species are identified on the panel in front of the viewing window, and the hand-held audio system provides additional interpretive material about the interactions in the kelp forest.

Habitat Description
The bottom layer of a kelp forest, showing the holdfasts of giant kelp on the ocean bottom, and the animals that live among the plants' fronds.

Preliminary Species List

Atka Mackerel	*Pleurogrammus monopterygius*
Kelp Greenling	*Hexagrammos decagrammus*
Giant Orange Nudibranch	*Tritonia diomedea*
Lemon Peel Nudibranch	*Tochuina tetraquetra*
Frilled Nudibranch	*Dendronotus sp.*
Kelp Crab	*Pugettia gracilis*
Dungeness Crab	*Cancer magister*
Decorator Crab	*Oregonia gracilis*
Scallop Species	
Snail Species	
Rockfish Species	



T.11 King Crab

Type: Habitat
Size: 18,000 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will include species identifications as well as a short description of the deep bottom. More in-depth information about the yields of the commercial crabbing industry, as well as descriptions of more traditional methods of crabbing, will be included in the hand-held audio system.

Habitat Description
The habitat represents the deep ocean bottom about 600 feet deep. The lighting is dark; large king and tanner crabs roam across the bottom of the tank; and a few deep ocean fish swim above them.

Preliminary Species List

Alaska King Crab	*Paralithodes camtschatica*
Golden King Crab	*Lithodes aequispina*
Grooved Tanner Crab	*Chinoecetes tanneri*
Bardi Tanner Crab	*Chionoecetes bairdi*

T.12 Schooling Fish

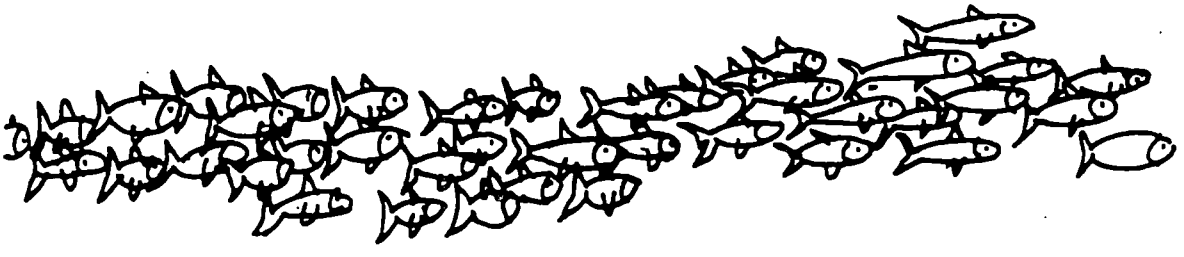
Type: Habitat
Size: 4,039 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will include species identifications of the two species: herring, which is the schooling fish; and sand lances, which burrow in sandy ocean. Both species are prey animals for the marine birds, whose tank is adjacent to this. The hand-held audio system will provide additional information on these fish.

Habitat Description
An open, sandy bottom tank. The sand will be deep enough so the sand lances can burrow down into it.

Preliminary Species List

Pacific Herring	*Clupea harengus*
Pacific Sand Lance	*Ammodytes hexapterus*



T.13 Jellyfish

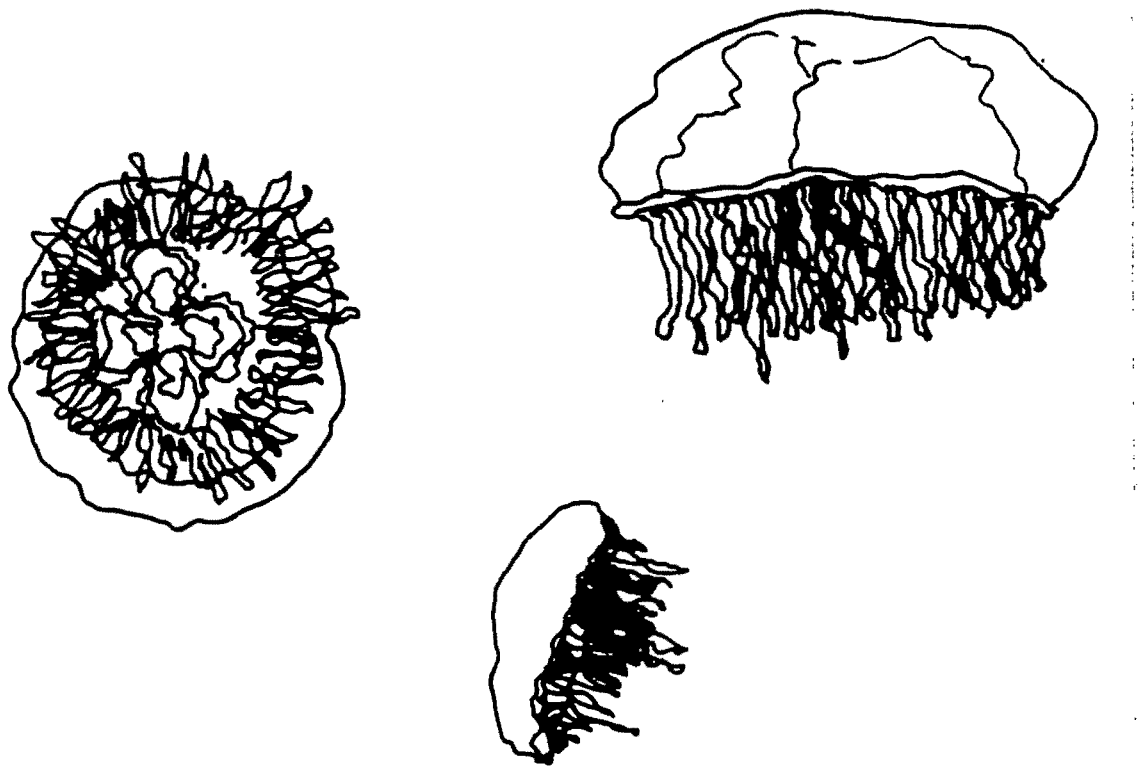
Type: Habitat
Size: 2,020 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will include species identifications for the jellyfish. More in-depth information on these invertebrates will be included in the hand-held audio system.

Habitat Description
This tank is virtually clear of all remnants of habitat. Its bottom is lower than the viewing window, and its rear panel will be a glowing blue, to represent the open, seemingly endless, ocean. The tank will also have a "current," which will keep the jellyfish swimming in the water column.

Preliminary Species List

Moon Jellies	*Aurelia aurita*
Water Jellyfish	*Aequorea victoria*



T.14 Freshwater Stream Sink

Type: Habitat
Size: 8,341 gallons
Location: Main Level

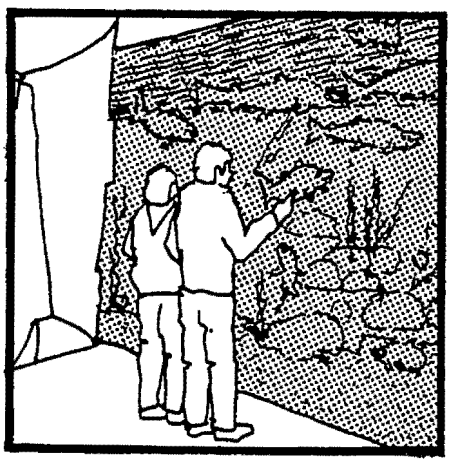
Exhibit Description
This tank has two viewing windows. The view from the Lobby will be purely visual, without any interpretation.

In the Underwater Gallery, interpretive graphics above the viewing window will include species identifications as well as short descriptions of the deep sink of a freshwater stream and the lifecycles of anadromous fish. More in-depth information about salmon hatcheries and traditional methods of fishing used by indigenous cultures will be included in the hand-held audio system.

Habitat Description
The freshwater stream sink is the deep pit at the bottom of a waterfall. Bubbles from water hitting the surface of this underwater tank will simulate the waterfall above. The sink will be filled with "debris" such as tree limbs, logs, and other natural rubble. Its sides are rocky, and the bottom is a combination of gravel and Alaska silt. Freshwater and anadromous fish wait among the limbs and logs.

Preliminary Species List

Dolly Varden Charr	*Salvelinus malma*
Coho Salmon	*Oncorhynchus kisutch*
Pink Salmon	*Oncorhynchus gorbuscha*
Chinook Salmon	*Oncorhynchus tshawytscha*
Chum Salmon	*Oncorhynchus keta*
Sockeye Salmon	*Oncorhynchus nerka*
Steelhead	*Salmo gairdneri*
Cutthroat Trout	
Threespine Stickleback	



T.15 Gulf of Alaska

Type: Habitat
Size: 8,116 gallons
Location: Main Level

Exhibit Description
Interpretive graphics above the viewing window will include species identifications. More in-depth information on these species as well as commercial and traditional fishing yields will be included in the hand-held audio system.

Habitat Description
This tank is virtually clear of all remnants of habitat. Its bottom is lower than the viewing window, and its rear panel will be a dark blue, to represent the open, seemingly endless, ocean.

Preliminary Species List

Spiny Dogfish	*Squalus acanthias*
Sablefish	*Anoplopoma fimbria*
Pacific Sleeper Shark	*Somniosus pacificus*
Salmon Shark	*Lamna ditropis*
Pacific Cod	*Gadus macrocephalus*
Walleye Pollock	*Theragra chalcogramma*
Pacific Tomcod	*Microgadus proximus*
Pacific Pomfret	*Brama japonica*
Pacific Ocean Perch	*Sebastes alutus*
Pink Salmon	*Oncorhynchus gorbuscha*
Chinook Salmon	*Oncorhynchus tshawytscha*
Coho Salmon	*Oncorhynchus kisutch*
Chum Salmon	*Oncorhynchus keta*
Sockeye Salmon	*Oncorhynchus nerka*
Steelhead	*Salmo gairdneri*
Big Skate	*Raja binoculata*
Longnose Skate	*Raja rhina*
Alaska Skate	*Bathyraja parmifera*
Aleutian Skate	*Bathyraja aleutica*

Educational Goals and Messages

Extracted Mission

The Alaska SeaLife Center is dedicated to two principles. The first principle is to **research** the impact of the Exxon Valdez Oil Spill on the region, and thus to initiate, sustain, monitor and accelerate the recovery of injured and endangered resources and their habitat.

The second principle is to **educate** the public that humans and their environment are inextricably one, and that conservation, research, and education are needed to motivate people to foster a sustainable lifestyle.

Organizational Goal

The ASLC educational programs will be organized in order to foster understanding, participation in, and support for the marine research and rehabilitation activities of the oil spill region.

Educational Goals

In addition to the specific educational goals that are listed earlier with each of the individual Gallery Descriptions, the Alaska SeaLife Center programs will be designed:

- To feature the scientific investigations occurring at the facility and to involve visitors in the significance and outcome of those investigations.

- To present current and future challenges and enhancement opportunities for the region's marine environment and the ways in which visitors can have a positive impact.

- To provide an educational component through which visitors will begin to comprehend their individual roles in as well as their collective impact on the Alaska marine ecosystem.

- To provide the opportunity for the public to interact with scientific researchers.

- To convey a sense of public ownership and responsibility for the region's marine environment and its component resources.

- To create a memorable and interdisciplinary portrayal of the history, key events, threats, and enhancement opportunities facing the region's marine environment.

- To provide an experience that will motivate visitors to a higher level of awareness and knowledge of the environment, its lifeforms, and their interrelationships.

Educational Messages

The central theme of the ASLC will be one of marine and aquatic ecology, recovery, and restoration of the South Central Alaska Coastal region. The theme will be expressed through the senses and experiential interactions with the ASLC exhibits. The theme will lead visitors to an understanding of sustainability, sustainable use, and balance for the ecosystem.

Society approaches daily life with little understanding of the environment, its mysteries, its treasures, and its fascinations. Taking so much for granted, humankind has a tendency to react to environmental situations, rather than to be proactive towards conservation and sustainability.

The messages and themes at the Alaska SeaLife Center will be tied to the natural connectedness that happens in nature. Each theme will champion conservational stewardship. Interpretation will emphasize the message that it is the responsibility of the present generation, as well as those who follow, to take a proactive role in the restoration and preservation of the planet Earth.

Outline of Interpretive Information

The ASLC's research component will provide the foundation for all educational programs and interpretive exhibits. In addition, interpretive displays will highlight aspects of cultural, political, and environmental history that are characteristic of the South Central Alaska Coastal region, including:

I. The Exxon Valdez Oil Spill—Factual Emphasis
Recreating the incident in context with the environment, describing the region before and after the oil spill, creating an emotional feeling for the mission of the exhibit

II. Definition of the EVOS Region
History, wildlife, oiling, problems, research, future human inhabitants, economics, sustainability, future

III. Economic Value of EVOS Resources
Commercial applications, conservation issues, future management, what this means to society and Alaska, and how the natural resources create Alaska's identity

IV. Species Interpretation
Identification, behaviors, living habits, environmental adaptations, food chain, population and reproduction status, oiling, endangered/threatened/injured status, recovery, restoration, re-release

V. Commercial and Sport Fisheries
Dependency on species, nurseries, habitats, reproduction status, oiling, seafood effects on humans, endangered/threatened/injured, industrial processes, shipping controls, future, sustainability conservation and regulation—the role of the ASLC and the State of Alaska in research on the environment

VI. Indigenous Peoples and Sustainable Living
The influence of the marine environment on Native Alaskan culture, history, language, music, religion, lodging, tools, diet, hunting implements, clothing, arts and crafts, and trade, coping with Alaska weather conditions, survival processes, the impact of Anglo settlement, understanding the cultural history and sociology of a people that have interacted with the environment for thousands of years, only taking what they need to survive

V. Integration with Research Subject Areas
Interpretive topics that reflect the research component, the core of the education program, include:

- Database Program for Research

- EVOS Damage Assessment

- EVOS Restoration Library

- Ecological Information/Species Specific

- Interpret Protocols and Techniques Used by Scientists

- Long-term phytoplankton and zooplankton composition

- Seward Line Oceanic Baseline

- Marine Biology and Ecology, including ecology of forage fish (non-commercial), population monitoring, health studies, hydroacoustic and acoustic Doppler current (profiles, net samples, biomass estimates)

- Fish and Invertebrates, their health, habits, population and reproduction status

- Marine Mammals, their health, habits, population and reproduction status, live animal studies, treatment, and rehabilitation

- Marine Birds, including avian health, habits, population and reproduction, live animal studies, investigation of seabird die-offs, treatment, and rehabilitation

- Submersible Research

a. Assessment of the physical and biological factors that affect Avian health and the survival of the species that feed in the pelagic and nearshore environments
b. Linkages between pelagic and benthic food webs in the EVOS area
c. Field studies—mating, rearing, molting predation, and species interaction
d. Studies of fish and invertebrates in benthic and nearshore envi ronments
e. Assessment of the quantity and distribution of benthic resources in high relief nearshore environments
f. Investigations of human-induced factors

Docent and Volunteer Program

The Educational Docent/Volunteer program is the most important facet of the visitor experience. Well-trained, enthusiastic front-line employees (or volunteers) are the human marketing arm for the facility, its mission, and its programs. Since docents represent the "personality" of the Alaska SeaLife Center, front-line and succinct scientific training is crucial to the success of the facility.

Educational Docents and Volunteers are integral to the interpretive process at the Alaska SeaLife Center. Because they will often serve as the main source of information for visitors, answering general and specific questions, they must be well-versed on all subject areas of the ASLC. They will lead guided field trips and groups; staff "interpretive stations" in various galleries throughout the facility; and staff and present programs for student camps and sleepovers. In addition, the docent and volunteer corps will interact with researchers to interpret themes and messages for visitors.

Recruiting

The primary geographical source of Docents and Volunteers will be from the Greater Seward area and from the University of Alaska. Development of intern programs is one methodology for staffing the summer season. Local residents will staff year round, and they will be the "backbone" of the docent staff.

Due to the limited population base in Seward, it is doubtful that the required number of docent positions can be staffed by volunteers. To have a successful volunteer working force, the population base of the urban and surrounding areas needs to be much larger. Innovative programs for recruiting will be developed in the next phase of work.

Training

Docents and Volunteers should come on line prior to the Grand Opening in June 1997. During the time prior to the opening, they must be thoroughly trained and integrated to the exhibits information base and mission. In addition to receiving a training manual and a training packet, Docents and Volunteers will attend a series of workshop training sessions.

In a Preference-style training session, Docents and Volunteers will learn about different personality styles, and they will develop the skills to play off their fellow workers' strengths. The Front-line training sessions will focus on:

a. The importance of the Mission of the Alaska SeaLife Center and how that mission influences interpretation
b. How to target an audience—learning to communicate at all levels of curiosity and intellect
c. Scientific information on exhibits and research at the ASLC
d. Facility infrastructure information
e. Communication training
f. Problem solving
g. Etiquette
h. Emergency situations

Coordination
Coordination and scheduling will be handled by the Education Docent/ Volunteer Coordinator.

Crosstraining
Going with the adage that "everybody needs to know something about everything," docents will be crosstrained in all methodologies of interpretation and education. People learn in many different ways, through hearing, moving, seeing, cognition, intuition, and by using their senses of touch and taste. Training will integrate these learning styles to interpret the mission, messages, and themes of the Alaska SeaLife Center.

Docents will be encouraged to become an information network with their peers and visitors, taking a "did you know?" attitude of excitement about the ASLC subject areas. A weekly docent newsletter will be formatted to share facts and logistics information about the routine at the ASLC. Docents will be able to discuss and interpret the aesthetics of the facility, local geography and topography, environmental impacts, the South Central Alaska Coastal Region, and the characteristics of marine creatures featured at the ASLC. They will be well versed in all printed materials, including marketing materials, maps, species guides, the Educational Docent/Volunteer Training Manual, curriculum, artifacts, and research that is the current focus of the ASLC.

Educational Docents and Volunteers will also be trained to understand the architectural and operational systems of the Center, such as water use and filtration, animal feeding habits and diets, multimedia systems, and the archives.

Recognition
Paid docents will be recognized for their outstanding contributions. Volunteers will also be recognized on a yearly basis, and a volunteer banquet or dinner should be held once a year to honor those who have given their time and energy to the Alaska SeaLife Center.