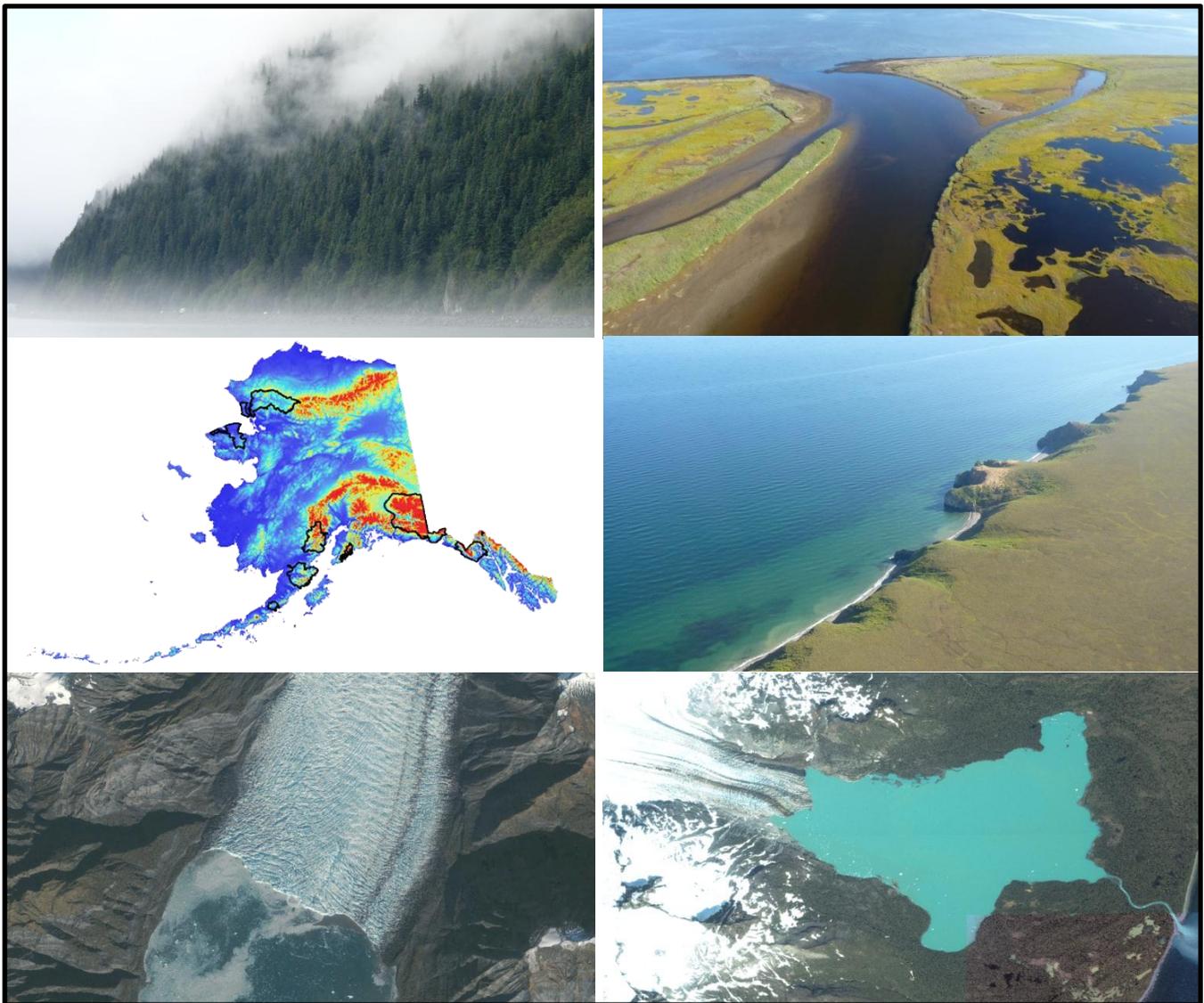




Alaska Region FY12 Coastal Operations Report

Status of Operations Update

Natural Resource Report NPS/AKRO/NRR—2014/792



ON THE COVER

Clockwise from top left: Seascape in Kenai Fjords National Park, Bering Land Bridge National Preserve near Cape Espenberg, Cape Krusenstern National Monument coastline, Satellite Imagery of Katmai National Park., Satellite Imagery of Icy Bay in Wrangell – St. Elias National Park.

Photograph by: Tahzay Jones, National Park Service, except satellite imagery: IKONOS composite.

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Natural Resource Report NPS/AKRO/NRR—2014/792

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U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate high-priority, current natural resource management information with managerial application. The series targets a general, diverse audience, and may contain NPS policy considerations or address sensitive issues of management applicability.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received formal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data, and whose background and expertise put them on par technically and scientifically with the authors of the information.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

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Contents

	Page
Figures.....	xi
Tables.....	xi
Executive Summary.....	xiii
List of Acronyms.....	xv
List of Contacts.....	xv
Introduction.....	1
Purpose.....	3
Ocean and Coastal Units.....	3
General Overview of Resources.....	3
Logistical Operational Challenges.....	7
Infrastructure.....	7
Threats to Resources.....	12
Environmental.....	12
Anthropogenic.....	18
AKRO Oceans and Coastal Program Operations.....	21
Budget:.....	21
Accomplishment highlights:.....	21
Individual Park Profiles.....	23
Aniakchak National Monument and Preserve.....	25
Enabling Legislation.....	25
Threats to Park Resources.....	25
Environmental.....	25
Anthropogenic.....	26
2012 Work within the Park.....	26
Biological.....	26
Physical.....	26
Chemical.....	26

Contents (continued)

	Page
Human dimension	26
Planned work within the Park	26
Biological	27
Physical	27
Chemical	27
Human dimension	27
Bering Land Bridge National Preserve	29
Enabling Legislation	29
Threats to Park Resources	29
Environmental	29
Anthropogenic	30
2012 Work within the Park	31
Biological	31
Physical	31
Chemical	32
Human dimension	32
Planned work within the Park	32
Biological	32
Physical	33
Chemical	33
Human dimension	33
Cape Krusenstern National Monument	35
Enabling Legislation	35
Threats to Park Resources	35
Environmental	35
Anthropogenic	36
2012 Work within the Park	36

Contents (continued)

	Page
Biological	37
Physical	37
Chemical	37
Human dimension	37
Planned work within the Park	38
Biological	38
Physical	38
Chemical	39
Human dimension	39
Glacier Bay National Park and Preserve	41
Enabling Legislation	41
Threats to Park Resources	42
Environmental	42
Anthropogenic	42
2012 Work within the Park	43
Biological	43
Physical	44
Chemical	45
Human dimension	46
Planned work within the Park	46
Biological	46
Physical	47
Chemical	47
Human dimension	47
Katmai National Park and Preserve	49
Enabling Legislation	49
Threats to Park Resources	49

Contents (continued)

	Page
Environmental.....	49
Anthropogenic.....	50
2012 Work within the Park.....	50
Biological.....	50
Physical.....	51
Chemical.....	51
Human dimension.....	51
Planned work within the Park.....	51
Biological.....	51
Physical.....	52
Chemical.....	52
Human dimension.....	52
Kenai Fjords National Park.....	55
Enabling Legislation.....	55
Threats to Park Resources.....	55
Environmental.....	55
Anthropogenic.....	56
2012 Work within the Park.....	56
Biological.....	56
Physical.....	57
Chemical.....	57
Human dimension.....	58
Planned work within the Park.....	58
Biological.....	58
Physical.....	59
Chemical.....	59
Human dimension.....	59

Contents (continued)

	Page
Klondike Goldrush National Historical Park.....	61
Enabling Legislation.....	61
Threats to Park Resources	61
Environmental.....	61
Anthropogenic.....	62
2012 Work within the Park.....	62
Biological.....	62
Physical.....	63
Chemical.....	63
Human dimension.....	63
Planned work within the Park.....	63
Biological.....	63
Physical.....	63
Chemical.....	64
Human dimension.....	64
Lake Clark National Park and Preserve.....	66
Enabling Legislation.....	67
Threats to Park Resources	67
Environmental.....	67
Anthropogenic.....	67
2012 Work within the Park.....	68
Biological.....	68
Physical.....	68
Chemical.....	69
Human dimension.....	69
Planned work within the Park.....	69
Biological.....	69

Contents (continued)

	Page
Physical	69
Chemical	70
Human dimension	70
Noatak National Preserve	73
Enabling Legislation	73
Threats to Park Resources	73
Environmetnal	73
Anthropogenic.....	73
2012 Work within the Park.....	73
Biological.....	74
Physical.....	74
Chemical	74
Human dimension	74
Planned work within the Park.....	74
Biological.....	74
Physical.....	74
Chemical	74
Human dimension	74
Sitka National Historical Park	76
Enabling Legislation	77
Threats to Park Resources	77
Natural.....	77
Anthropogenic.....	78
2012 Work within the Park.....	78
Biological.....	78
Physical.....	79
Chemical	79

Contents (continued)

	Page
Human dimension	79
Planned work within the Park.....	79
Biological	79
Physical	80
Chemical	80
Human dimension	80
Wrangell – St. Elias National Park and Preserve.....	83
Enabling Legislation	83
Threats to Park Resources	83
Natural.....	83
Anthropogenic.....	84
2012 Work within the Park.....	84
Biological.....	84
Physical.....	85
Chemical	85
Human dimension	85
Planned work within the Park.....	86
Biological.....	86
Physical.....	86
Chemical	86
Human dimension	86
Literature Cited	87

Figures

	Page
Figure 1. Relative size of Alaska compared to the continental 48.....	4
Figure 2. The total estimated coastal shoreline miles and water acres in all of the Alaska Parks compared to the total shoreline miles in all other National Park units not in Alaska by region (data from Curdts 2011). AKR – Alaska Region, IMR – Intermountain region, MWR – Midwest Region, NER – Northeast region, PWR – Pacific West Region, SER – Southeast Region.	5
Figure 3. The total park operating budgets per acre for each region	6
Figure 4. The total park operating budgets per coastal mile for each region.....	6

Tables

	Page
Table 1. Fiscal year 12 oceans and coastal program lead workplan	2
Table 2. The rankings of the 10 longest shorelines and 10 largest marine/great lake water acres within all National Park Units in the National Park Service (data from Curdts 2011).....	5
Table 3. Oceans and Coastal programs project budget. Purposes are a brief description of the budgetary expense.....	21

Executive Summary

Eleven of 14 national parks in the Alaska Region can be considered coastal parks, meaning the parks have coastline and/or coastal watersheds that contribute to ecosystem function along the coastal areas of Alaska. In 2011 a regional coastal programs coordinator was hired to coordinate efforts, provide expertise, and support accomplishing the goals set forth in the existing regional strategies to address existing or developing resource concerns that included both environmental and human caused concerns such as acidification, climate change, permafrost melt, erosion, external resource development and extraction, marine traffic, and coastal use. However, resource budgets, staff, and time available to address coastal issues are extremely limited, throughout the region, even compared to other regions with coastal parks in the National Park Service. Additionally, logistical restraints associated with field endeavors can be extremely limiting particularly with existing infrastructure, scale and remoteness considerations, and wildlife concerns.

Regardless of these constraints, there has been a significant amount of progress, both in gaining the information necessary to conduct coastal management operations within the Alaskan National Parks, and in conducting operations within the coastal areas of the Parks. Coordinated efforts by the new oceans and coastal program in the Region included: addressing monitoring and clean-up of Japanese tsunami debris with other federal agencies, the state, and NGO partners; engaging in a project (ShoreZone) to image and map the gross physical and biological features from Cape Prince of Wales to Point Hope in Northwestern Alaska, by partnering with the Fish and Wildlife Service, NOAA, Bureau of Ocean and Energy Mangement, and the State of Alaska to accomplish these efforts; supporting regional engagement of coastal climate change concerns through background research and participation in the climate change scenario planning workshops and the national coastal adaptation to sea level rise training efforts; participating in, and supporting the development of, the lagoon monitoring protocol for the Arctic Inventory and Monitoring Program through planning, field efforts, and data analysis; and participating in a management review of the Oceans Alaska Science and Learning Center and the hiring process for the new director.

The Inventory and Monitoring (I & M) program is providing a significant amount of baseline work in relation to coastal issues in most coastal parks, with the notable exception of Wrangell-St. Elias. The I&M program; however, has its own limitations and does not provide all the science necessary for management to base decisions. Park efforts are variable and scaled to staff size and expertise, and reduced by other driving issues parks are facing. Much more progress is needed to gather enough information to give resource managers solid scientific footing for making management decisions in most of the Alaskan coastal parks.

The Alaska regional oceans and coastal program has worked throughout fiscal year 2012 to meet with coastal park managers and staff to develop a background of concerns each park faces with for resource management. Efforts are now initiated for a regional strategic approach towards providing parks with the assistance necessary to address individual park issues and to group multi-park issues to a regional strategy.

This report also summarizes by park, founding legislation in relation to the coastal environment, current threats (natural and human), current operations, and planned future studies and efforts. Efforts are separated by discipline. This report is designed to give management at all levels a single reference to understanding ongoing Alaska regional park coastal resource operations.

List of Acronyms

AKR	Alaska Region of the National Park Service
AKRO	Alaska Regional Office for the National Park Service
ANIA	Aniakchak National Monument and Preserve
ANILCA	Alaska Natural Interest Lands Conservation Act (Public Law 96-487, 94 Stat 2371)
ARCN	Arctic Inventory and Monitoring Network
BELA	Bering Land Bridge National Preserve
CAKN	Central Alaska Inventory and Monitoring Network
CAKR	Cape Krusenstern National Monument
GLBA	Glacier Bay National Park and Preserve
I&M	Inventory and Monitoring Program
KATM	Katmai National Park and Preserve
KEFJ	Kenai Fjords National Park
KLGO	Klondike Goldrush National Historical Park
LACL	Lace Clark National Park and Preserve
NOAT	Noatak National Preserve
NPS	National Park Service
POPS	Pacific Ocean Parks Strategy (National Park Service 2008)
PMIS	Project Management Information System
PWR	Pacific West Region of the National Park Service
SEAN	Southeast Alaska Inventory and Monitoring Network
SITK	Sitka National Historical Park
SWAN	Southwest Alaska Inventory and Monitoring Network
WASO	Washington Service Office for the National Park Service
WEAR	Western Arctic Parklands
WRST	Wrangell – St. Elias National Park and Preserve

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Introduction

In 2011 the National Park Service (NPS) Alaska Regional Office (AKRO) hired an Ocean and Coastal Programs Lead to develop a regionally cohesive approach to addressing the ocean and coastal issues facing Alaska Region National Park Units. This position is part of the National Oceans and Coastal Program established in the Water Resources Division of the Natural Resource Stewardship and Science Program. In working with the parks to develop a cohesive plan for administering coastal resources within the Alaska Region (AKR), existing strategies were identified.

Currently, outside of park specific plans, there are two overarching management strategies that are currently utilized in addressing coastal management within the AKR: the Pacific Ocean Parks Strategy (NPS 2008) (POPS) and the Alaska Regional Natural Resource Program Strategy (NPS 2011). The primary document is the POPS and was developed in 2008 as a Coastal and Ocean Parks strategy for both the Pacific West (PWR) and the Alaska Regions of the National Park Service (NPS).

When the POPS was written, the identified common threats facing park superintendents in both the PWR and AKR were coastal development, nutrient runoff, declining water quality, ocean pollution, overfishing, and the introduction of invasive species. However, also recognized were climatic changes that would necessarily impact coastal and marine systems, but the degree to which that would occur was not known (NPS 2008).

The POPS plan included 4 primary strategies towards effective long-term conservation of park marine and coastal resources which included (NPS 2008):

- 1) Establish a seamless network of ocean parks, sanctuaries, refuges, and reserves;
- 2) Inventory, map and protect ocean parks;
- 3) Engage visitors and the public in ocean park stewardship;
- 4) Increase technical capacity for ocean exploration and stewardship

Goals within each of these strategies were clearly laid out, with some more appropriate to specific regions. However, the efforts were decentralized and required staff from individual parks to support the effort. The Regional Ocean and Coastal Program leads hired in the PWR and the AKR are expected to varying degrees, to address regional approaches towards obtaining the goals outlined in the POPS.

However, implementation of this specific strategy was never intended to be the sole function of the regional oceans and coastal program leads. In the Alaska region, four primary goals of the Ocean and Coastal Programs lead were identified:

- 1) Provide parks assistance with ocean and coastal issues;
- 2) Serve as an information conduit between Washington Service Office (WASO) and parks;
- 3) Identify, develop, and maintain external partnerships;
- 4) Provide technical expertise and assistance in AKR natural resource team responsibilities

These specific categories of requirements enables the AKR flexibility to address many issues and goals associated with the POPS plan, while also providing for the needs of the national oceans program, the region, and the parks. Regionally, questions identified in the Alaska Regional Natural Resource Program Strategy (NPS 2011a) now have a position that can focus on getting them answered. In FY 12 the work accomplished, planned, and proposed are illustrated in Table 1.

Table 1. Fiscal year 12 oceans and coastal program lead workplan. This table indicates the planned, proposed, and accomplished work and how that work relates to the critical elements assigned to the position.

EPAP Critical Element	FY12 work (accomplished, planned, and proposed)
Provide parks assistance with ocean and coastal issues	<ul style="list-style-type: none"> Work with Parks to develop Ocean and Coastal PMIS projects Work with KATM/ANIA on approved technical assistance request Finalize PMIS projects as necessary Review and assist in ARCN lagoon monitoring protocol revisions and implementation Develop and oversee an assistance request program to support parks out of oceans and coastal program funding WEAR lagoon physicals pilot development and implementation Site visit SEAK Parks for coastal issues (rapid coastal assessments) Site Visit LACL Coast for coastal issues discussions and examination ShoreZone Project Contract writing Coastal Synthesis Agreement writing
Serve as an information conduit between WASO and Parks	<ul style="list-style-type: none"> Participate in NPS Ocean coordination calls Reinstitute Regional Oceans and Coastal calls Coastal and Oceans work reporting to WASO Inform parks of WASO progress, information, and initiatives as appropriate Develop budget and plan for next FY Internal outreach on Ocean and Coastal Issues Participate in Pacific Ocean Education Team Calls
Identify, develop, and maintain, external partnerships	<ul style="list-style-type: none"> NOAA marine debris partnership development NOAA LACL Tidal station gauging measurements project Alaska Marine Science Symposium Agreements Training Climate Vulnerability Training Participate in CMSP planning Participate in Alaska Marine Forum calls Participate in Marine Invasive Species calls Participate in Alaska Marine Ecosystem meetings
NRST Team Participation, Safety, and Outreach	<ul style="list-style-type: none"> Natural Resources Refresher – Lead Ocean and Coastal Breakout Participate in Natural Resource Team meetings AKR all employees meeting presentation Work with NRAC to review PMIS proposals Review OASLC technical Assistance Request proposals Participate in OASLC program review SEAK Climate Change Scenario Planning

With personnel now in place, the associated synthesis of work currently being accomplished throughout the region can be identified and future planned activities can be coordinated to best utilize the limited resources available to the region.

Purpose

The purpose of this synthesis report is to provide an up-to-date accounting of the general and park specific resources, threats, logistical challenges, enabling legislations, current efforts being directed towards developing an understanding and furthering of resource management capabilities throughout the Alaska Region coastal units of the National Park Service.

Ocean and Coastal Units

There are 11 coastal units of the National Park Service in the Alaska Region. These units are defined as units that contain coastal and/or ocean ecosystems. These units are:

- Aniakchak National Monument and Preserve (ANIA),
- Bering Land Bridge National Preserve (BELA),
- Cape Krusenstern National Monument and Preserve (CAKR),
- Glacier Bay National Park and Preserve (GLBA),
- Katmai National Park and Preserve (KATM),
- Kenai Fjords National Park(KEFJ),
- Klondike Goldrush National Historical Park (KLGO),
- Lake Clark National Park and Preserve (LACL),
- Noatak National Preserve (NOAT)*,
- Sitka National Historical Park (SITK),
- Wrangell - St. Elias National Park and Preserve (WRST).

*NOAT is considered here to be a part of the coastal parks because it contains approximately 3,000 acres of coastal wetlands south of Shiliak Creek, near the Noatak River Delta and Hotham inlet. It lies 0.6 miles from the ocean.

General Overview of Resources

Relative to the rest of the United States National Park units, Alaska Parks are large.

Understanding the scale of Alaska and the units within the Alaska National Park System (Figure 1) is crucial to understanding the challenges of administering the resources within these park units. At more than twice the size of Texas, Alaska (663,267 mi²) contains approximately 17.5% of the total land area of the United States (3,794,083 mi²), and is larger than the 3 largest contiguous 48 states (Texas, California, and Montana) combined (US Census Bureau 2000).

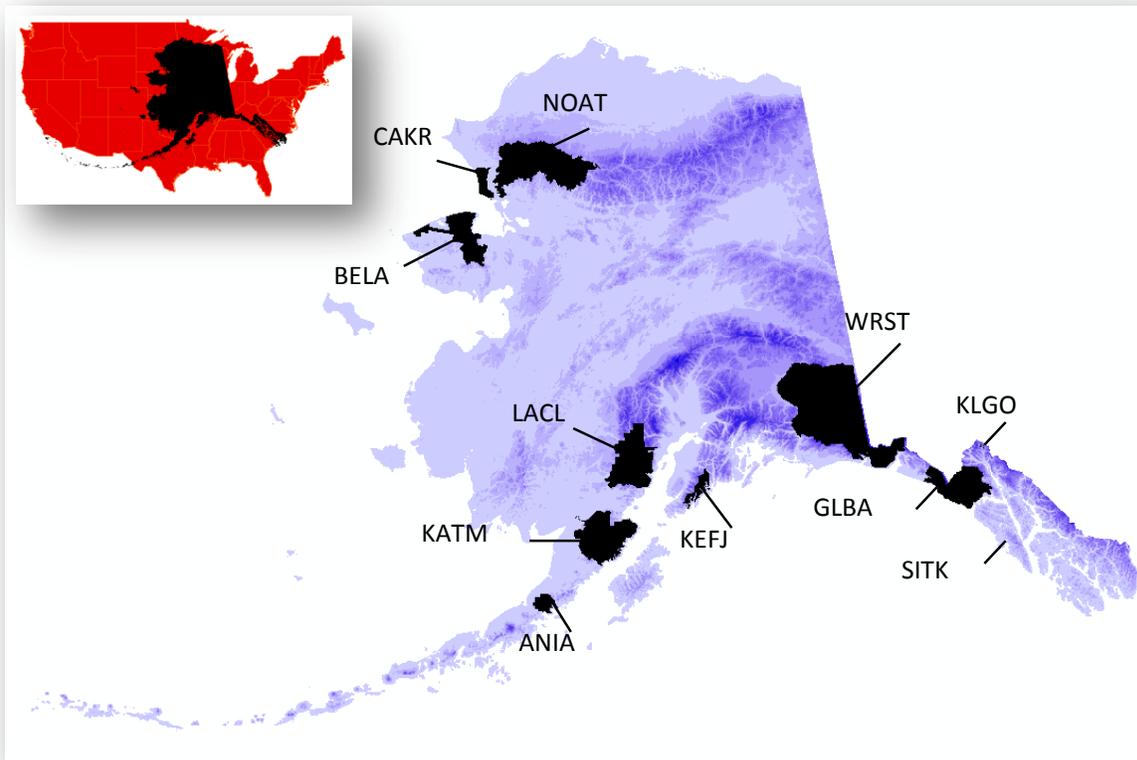


Figure 1. Relative size of Alaska compared to the continental 48. (data from ESRI USA States layer package 2011 and 2009 Alaska 1:63,000 data layer - Alaska Department of Natural Resources). Alaska regional coastal park units (Data from NPS AKRO GIS Team).

The coastal units of the AKRO (Figure 1) total 45,642 mi², more land than the entire state of Ohio 44,825 mi² (NPS 2011b and US Census Bureau 2000). Combined, these coastal units make up more than 32% of all coastal shoreline in the NPS (Figure 2) and almost 30% of the total water acreage administered by the National Park Service (Curdts 2011).

The AKR manages 5 of the 10 parks with the most shoreline miles, and 2 of the 10 parks with the most water acreage, including the park with the most water acreage in the NPS (Table 2).

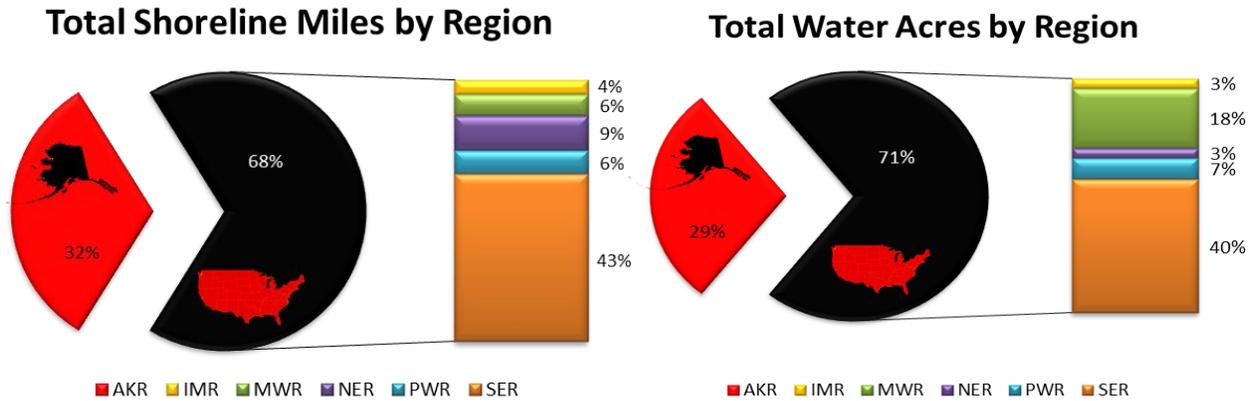


Figure 2. The total estimated coastal shoreline miles and water acres in all of the Alaska Parks compared to the total shoreline miles in all other National Park units not in Alaska by region (data from Curdts 2011). AKR – Alaska Region, IMR – Intermountain region, MWR – Midwest Region, NER – Northeast region, PWR – Pacific West Region, SER – Southeast Region.

Table 2. The rankings of the 10 longest shorelines and 10 largest marine/great lake water acres within all National Park Units in the National Park Service (data from Curdts 2011). Miles indicate shoreline miles and acres indicate marine or great lakes surface water acreage. AKR – Alaska Region, IMR – Intermountain region, MWR – Midwest Region, NER – Northeast region, PWR – Pacific West Region, SER – Southeast Region.

Rank	Park	Miles	Region	Rank	Park	Acres	Region
1	Everglades	2,452	SER	1	Glacier Bay	598,611	AKR
2	Glacier Bay	1,179	AKR	2	Everglades	547,240	SER
3	Timucuan	632	SER	3	Isle Royale	408,339	MWR
4	Bering Land Bridge	571	AKR	4	Biscayne	164,864	SER
5	Kenai Fjords	545	AKR	5	Channel Islands	120,258	PWR
6	Katmai	458	AKR	6	Gulf Islands	110,387	SER
7	Padre Island	418	IMR	7	Bering Land Bridge	87,808	AKR
8	Cape Krusenstern	375	AKR	8	Padre Island	72,478	IMR
9	Assateague Island	357	NER	9	Dry Tortugas	65,476	SER
10	Cape Lookout	343	SER	10	Cape Canaveral	37,825	SER

However, along with this significant amount of area, come significant budgetary restraints. The total operating budgets of each of these parks is very small compared to other coastal park operating budgets throughout the National Park Service (Figure 3). The Alaska regional parks on average receive 1/10 of 1 cent per acre to conduct all park administration, maintenance, law enforcement, interpretation, and other operations, including natural resource studies and management. This is an order of magnitude less than the next closest region, the Southeast Region, which receives approximately 29 times more operating budget per acre for each coastal park and 514 times less operating budget per coastal park than the Northeast Region.

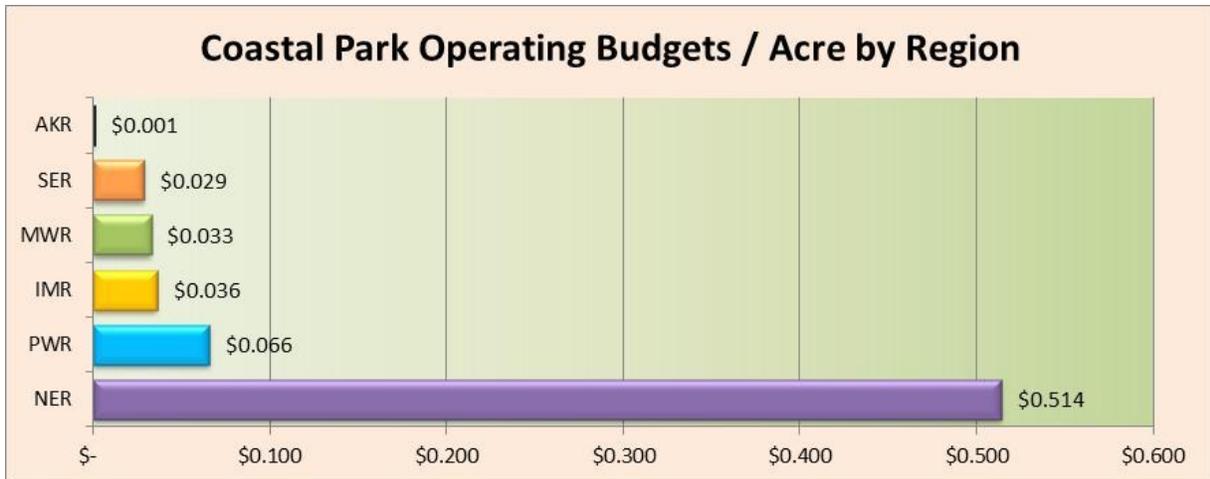


Figure 3. The total park operating budgets per acre for each region. Operating budgets determined using FY 2011 total park budgets (USDOI 2012), total acreage determined using gross acreage (NPS 2011), and coastal parks in each region determined using Curdts (2011) coastal park identifications. AKR – Alaska Region, IMR – Intermountain region, MWR – Midwest Region, NER – Northeast region, PWR – Pacific West Region, SER – Southeast Region.

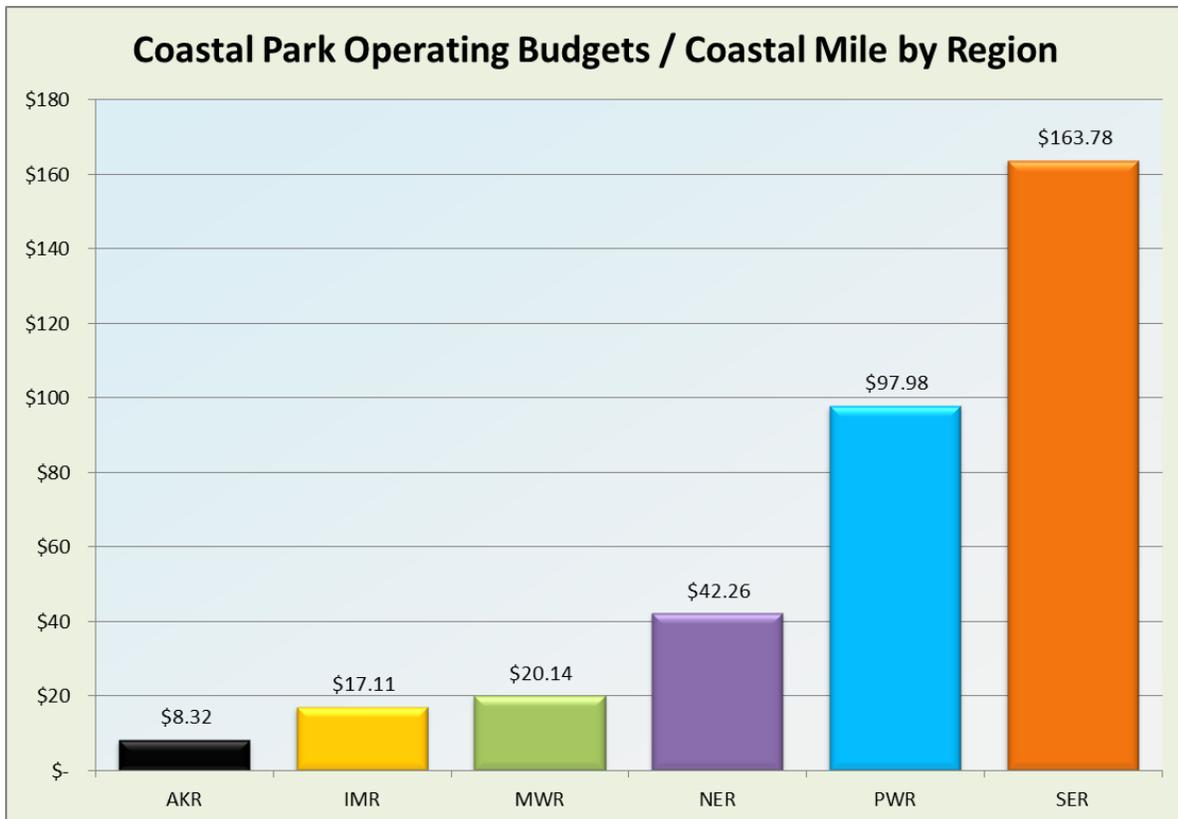


Figure 4. The total park operating budgets per coastal mile for each region. Operating budgets determined using FY 2011 total park budgets (USDOI 2012), total coastal miles and coastal parks identification in each region determined using Curdts (2011) coastal park identifications. AKR – Alaska Region, IMR – Intermountain region, MWR – Midwest Region, NER – Northeast region, PWR – Pacific West Region, SER – Southeast Region.

When examining the operating budgets on a per shoreline mile basis, We again observe that the Alaska Region receives less than half of the total operating costs than the next comparable region (the Intermountain Region) and almost 20 times less operating budget than the Southeast Region (Figure 4). Because of these budgetary restraints, the Alaska region has historically limited the amount of dollars expended in oceans and coastal research, inventory, monitoring, and general studies efforts.

This limited budget impacts the regional capabilities of carrying out resource management in significant ways. Obvious impacts include reduced frequency and ability to get to locations within the parks for conducting resource management operations in addition to reducing the numbers of possible projects, and hence larger scale ecosystem understanding. However, because of these budgetary concerns, natural resource management operations within Alaska have become extremely targeted and efficient with great success and effectiveness because of the planning required to successfully carry out the intended missions, and the requirements that projects be in direct support of Park mission critical necessities relative to potential resource management actions and future planning. Crucial to the success of resource project planning and implementation has been the development of understanding and appropriately addressing the myriad of logistical hurdles and challenges that must be faced to safely operate in the arctic and subarctic parklands administered in the Alaska region.

Budgetary limitations have led resource projects in Alaska to become extremely targeted and effective because of the planning required to carry out successful missions.

Logistical Operational Challenges

Alaska parks present many logistical challenges, which are important to consider and can greatly effect operations; however, are not impossible to overcome. These challenges come in the form of natural and infrastructure hurdles.

Infrastructure

There is often very little infrastructure within most coastal park units. The most immediately apparent challenge is transportation. Most of the coastal regions of Alaska are not accessible by roads. This is particularly true for the national parks in Alaska, where, with the exceptions of KLGO and SITK and the docks at Bartlett cove in GLBA, the coasts are not connected with any road systems. However, there are also challenges associated with lodging, staffing, and communications.

Aircraft

Access to the majority of Alaska national park coasts is generally by aircraft or marine vessel. These options can carry significant operational costs. Government owned aircraft take the form of floatplanes and wheeled planes. Both government aircraft options operate at an expense of approximately \$250 - \$350 per hour depending on the aircraft used.

Contract options include float planes, wheeled planes, and helicopters. Float plane and wheeled planes operate at approximately \$550 - \$650 per hour depending on the size of the aircraft operated. Helicopters are approximately \$750 - \$800 per hour for the smallest helicopters ranging up to \$1300 without fuel for high capacity and long range helicopters.



Float planes provide excellent access in protected areas with calm water and to open areas on calm days, with their primary limitation to access coming from wave heights. The possibility of being stranded awaiting reduced wave heights is significant because the pilot is unable to safely land.

Wheeled planes provide excellent access in areas where there is plenty of consolidated beach or a nearby airstrip on which to land the plane. Access can be limited by stranded marine debris, length of beach, width of beach, and a vegetative encroachment structure relative to the beach preventing safe landing.

Helicopters provide excellent access to locations that are not readily serviced by fixed wing aircraft. Primarily areas where there is no landing strip, beach length is inadequate for plane landing or take-off, beach obstructions prevent safe landing or take-off, or winds create waves such that reliable float plane landing is not a feasible option.

Regardless of the mode of transportation, payload is a significant concern. Careful consideration must be made while planning to adequately address this significant concern. While the smaller aircraft may be cheaper, they may not be capable of holding the payload required to accomplish the mission. Thus multiple aircraft, multiple trips, or larger aircraft may need to be procured to accomplish operational requirements.

Watercraft

Boats are another option that available. With the exception of WRST, KLGO, and SITK, the coastal parks have some type of watercraft that can be used for park based coastal operations. These are typically in the form of a Zodiac type watercraft (motorized inflatable rigid bottom craft). However, LACL, GLBA and KEFJ operate larger vessels capable of extended work cruises of multiple days. Scheduling work with these vessels requires extensive pre-planning with the parks to ensure their availability and determine the operational costs of these craft which can be significant (>\$1500/day).



Other Transportation

Other options that are marginally available depending on location, park, and time of year are bicycles (fat tire only), ATVs, and snowmobiles. All provide quick but potentially limited access and range. The operations of these modes of transportation require consultation with the park as to their availability, training necessities, and load hauling capacities if required.

Lodging

Alaskan park units have very limited capacity for lodging, exacerbated by the fact that most lodging is nowhere near most work site locations. This requires all coastal operations to plan well in advance of field operations, particularly in the summer months. Counting on park housing for lodging is generally not a safe bet for a stay of any significant length, and will require transportation from the lodging to the work location. Nevertheless, park lodging is available in most coastal parks.

There are some ranger stations that are scattered along the coasts in some parks. These ranger stations are in various stages of repair. Unless work is intended at the location where the ranger station is, the primary form of lodging is camping.



Staffing

Most of the coastal parks have limited resource staff available for project work and logistics facilitation. Some parks have a person in the park placed specifically for assisting with logistics. This is particularly true in WEAR and KEFJ. However, park based I&M personnel have assisted with logistics in other areas as an ancillary duty or if work is specifically focused on adding to or expanding I&M activities.

Communications

Communications can often be challenging in the remote locations of the Alaskan parks. Multiple forms of communication are required when working in the ocean and coastal regions of the Alaskan coastal parks. Radios frequently are not a reliable means of communications. Satellite phone is the preferred method in most instances. However, backup communications is required if your primary communication source is lost. Most parks have specific backcountry rules that must be followed to ensure employee safety. Generally an EPIRB (Emergency Position Indicating Radio Beacon) is recommended if not required. It is imperative to be prepared for lengthy waits if evacuation is warranted because these operations can take significant amounts of time given the remote locations and potentially weather restricting conditions.



It is incumbent upon the individuals completing the work in a given park to be informed of the park processes and procedures for safe park operations.

In most coastal parks, check-in is mandatory at the beginning and end of each work day and requires contacting either staff in the Park or the Denali Communications Center to facilitate daily check-ins.

Environmental FactorsThe obvious challenge here is the sheer scale at which operations often take place. This challenge along with the many associated challenges can be addressed using some critical thinking and foresight.

Scale

Alaska is big. The distances between lodging and site locations can be significant often requiring several hours of flight time to arrive at destination. Even travel from site location to location within a park can require significant time costs and commitments to accomplish both completely and safely. Because of the scale, travel time is a significant component to all coastal operations in Alaska national parks, with the exceptions of KLGO and SITK. Careful planning in operational strategy and project design are a necessity for all coastal projects.

Wildlife

The wildlife in Alaska is abundant in all sizes and scales, presenting a distinct need for careful consideration in planning operational efforts. Consideration must be made for both personal safety and equipment longevity. There are immediate personal safety concerns presented by



bears, moose, and insects; though all wildlife is potentially harmful and dangerous to human health. It is important the work being conducted in the Alaskan National Parks consider the personal safety of all involved, including any necessary training to understand how to address wildlife safety concerns.

Additionally, wildlife can mark, mutilate, tear, and destroy equipment. Without the proper planning and precautions, fieldwork can be cut short or fail to yield results. It is therefore important when planning fieldwork to be aware and cognizant of the potential damage and threat

to the success of the operations being conducted presented by the wildlife specific to the area of operations.

Climate

The Alaskan climate is subject to rapid shifts in weather. Because of the remote nature of working in the Alaskan backcountry, being prepared for inclement weather conditions is paramount. Winter operations must account for the possibility of conducting operations and camping in extremely low temperatures (below -20°F) and snow. Additionally, summer weather is unpredictable and can produce significant winds, surf, and rain with little notice. Weather is a leading factor in being stranded for multiple days in remote locations because of the inability to fly or boat safely.



Water temperatures can easily be below 50°F in the summer requiring special precautions for prolonged work in that environment. With frequent storms, the combination of temperature and inability to remain dry can rapidly lead to hypothermic conditions. Appropriate weather contingency planning is required for safe remote coastal operations.

Remoteness



Because of the remote nature of most of the coastline in the Alaskan parks, it is crucial to be aware that outside help can be unavailable or arrive with significant time delays. Being prepared for unexpected delays is imperative. It is not uncommon to be stranded in town or in the field for multiple days. Preparing for this likelihood is important when considering food supplies and emergency preparedness. It is therefore necessary to be prepared to mitigate all

potential hazards with appropriate training and precautions to successfully carry out all planned operations.

Other considerations

Day length must be considered. Because of the far northerly latitudes that Alaskan park operations take place in, daylight can extend up to 24 hours in the summer in the northern most Parks. Daylight frequently exceeds 20 hours in most Alaskan parks. Attention must be paid to how long individuals are functionally working on any given day in the field, so as not to exhaust field personnel and retain critical safety oriented decision making skills. Sleep can also be challenging because of the light. Therefore, ensuring all field personnel are properly rested must be a consideration for continued operations.

Accurate maps may not exist for the area of work being considered. It is advisable to consult with individuals with local knowledge about the general area before embarking on field operations. Additionally, it is important to be prepared for dealing with map inaccuracies, particularly when using USGS topographic maps. These were generally created in the 1950s and known physical and geological activity has taken place in the interim, including significant erosion, earthquakes, volcanic activity, and deglaciation.

Tides in Alaskan parks range from over 20 feet to approximately 1 foot. Given these wide tidal ranges, it is extremely important to know and understand the tides in the area of operations. There are many places where islands may be connected at one tide and not at another, which can lead to strandings waiting for tide changes. Additionally knowing when and where boat and floatplane operations can take place based on tides is also critical to avoiding delays.



While these challenges are not simple, they do not preclude successfully addressing resource concerns. Indeed, they make resource concerns targeted and effective because of the planning required to successfully carry out the intended missions.

Threats to Resources

Regardless of the generally perceived size of Alaska and the national parks contained therein, it is extremely important to remember that these national parklands face a myriad of both natural and human caused threats that currently are, or potentially will be, affecting their ocean and coastal resources. It is also imperative to understand that these ecosystems are not constrained by jurisdictional boundaries, and threats and impacts external to the parks can and frequently will have significant impacts within park boundaries. Complex in their nature, understanding and developing appropriate management actions to address spatially and temporally proximal threats and concerns is equally, if not more, challenging.

Environmental

Ocean acidification



Ocean acidification is one of the most significant issues facing our ocean and coastal resources. The process of ocean acidification is driven by the increase in atmospheric carbon dioxide (CO₂). Because CO₂ is soluble in water, as atmospheric CO₂ increases, there is a proportional increase in the amount of CO₂ dissolved into the water. While complex, ocean chemical interactions are such that the more CO₂ absorbed by the ocean, the more carbonic acid and bicarbonate created, and the less carbonate available (Doney et al. 2009). This is extremely important because many shelled organisms utilize carbonate (in a form of calcium carbonate) to make their support and protective structures. Additionally, changes in the acidity of the water can have other significant metabolic impacts. While there are widespread studies of the effects of acidification on corals, more concerning in Alaska are studies that indicate the potential larger ecosystem implications caused by the deleterious effects of acidification on phytoplankton

and their subsequent food webs (Feely et al. 2004, Fabrey et al. 2008) as well as the levels of acidification expected as a result of current and increasing global CO₂ levels (Caldeira and Wickett 2005, Meehl 2007). This work translates into expected metabolic and physiological constraints for calcareous organisms (shellfish, molluscs, and crustaceans) leading to early life stage developmental inhibitions, reduced fertility, and fertilization rates (Hoffman et al. 2010). These constraints, inhibitions, and reductions lead to likely changes in finfish (including salmon) and shellfish distribution and abundance, and ultimately declines in harvest (Cooley and Doney 2009).

Because subsistence is a significant issue in Alaskan national parks, loss of subsistence opportunities is and will continue to be a significant issue. However, that being said, equally important are the ecological food web linkages to other animals that utilize finfish and shellfish as primary food sources, including birds and mammals, which most Alaskan coastal parks were established to protect.

Climate change

Climatic changes bring a whole host of complexities that pose natural resource threats and resource management challenges to the ocean and coastal environments of the Alaskan National Park system. These complexities can take the form of increasing temperatures, loss of sea ice, melting permafrost, erosion, changing sea levels, increasing storm intensities, alterations of stream temperature and flow characteristics, glacier loss, wetland changes, precipitation changes, and phenological changes (Haufler 2010, McCabe et al. 2001, Hassol 2004).

It is important to note that the previous list is not exhaustive, and there may well be other significant issues associated with climate change that are not included in the above list (Smith et al. 2009). Furthermore, the complexities of climate change are all inter related and it is extremely difficult and somewhat artificial to separate out specific impacts without discussing their association to other elements of climate change. However, because all of these issues are fairly complex individually, they will be addressed separately with appropriate reference made to other climate change elements.



Increasing temperatures

Temperature changes are a major concern facing Alaskan parks in relation to all resources, and in particular, the ocean and coastal resources. Thermal changes to the environment, whether marine, aquatic, or terrestrial directly impact all species living the area of temperature increase (Rio and Kasarov 2010). Most of these impacts can or will effect ocean and coastal resources. In the ocean and nearshore environments, temperature increases are responsible for thermal expansion causing increased sea levels, increased evaporation, increased storm intensities, alterations in ice dynamics, shifted phenology, and expanded habitat compatibility and availability (Marcelja 2010, Karl and Trenberth 2003, Hassol 2004). However, of equal concern are the effects increasing temperatures may have on coastal and terrestrial ecosystems including glacier melting, permafrost loss, changes in precipitation abundance and form, environmental compatibility, and habitat availability (Simon et. al 2005).



In general, increased temperatures lead to melting ice in all forms: glacier ice, permafrost, and sea ice (Hassol 2004). Increases in terrestrial melt, translate to increased freshwater flow into coastal and nearshore environments, altering the physical habitat by increasing terrestrial and coastal erosion, changing nearshore circulation patterns, decreasing buffering capacity against acidification, and modifying salinity gradients and profiles (Walsh et. al 2005). Increased water temperatures lead to increased evaporation and subsequent precipitation compounding both the ice melt and water availability issues. Furthermore, increased sea surface temperatures are correlated with changing storm tracks, so location of precipitation may also become an issue (Rodinov et al. 2007).

Temperature is also a limiting factor on many organisms' abilities to survive and reproduce. Increases in temperatures are theorized to cause a northerly shift in the viable geographic ranges of many species that were limited in their northern extent by temperature, opening up high latitude parks for more species, and thus more habitat availability through environmental compatibility (Callaghan et al. 2005).

Increasing stream temperatures may limit the viability of species to migrate and reproduce. Salmonids migrate near specific temperature thresholds (Eliason et. al 2011). As streams are warmed by increasing temperatures, migration and subsequent reproductive success may decrease (Farrell 2009). When temperatures reach certain thresholds, complete reproductive failure is possible.



Increased storm intensities

Increased storm intensities are highly correlated with increased sea surface temperatures and high latitude increases in storm frequency (McCabe et. al 2001). Greater storm intensities and frequencies threaten park resources through increased erosional opportunities both in coastal streams and along coastal margins. Increases in precipitation can cause flooding events and increased sediment deposition in streams and along coastlines (Walsh et. al 2005). Increased

sediment deposition alters the habitat, often reducing the available habitat options suitable for many finfish species to effectively reproduce (Richter et. al 1997).

Decreasing sea and shore ice conditions

Sea ice and shorefast ice (ice that is frozen to the shoreline) are important in circulation and ecosystem function in the northwest Arctic (George et.al 2004). Shorefast ice can serve as a protective armoring of the coastline against fall and winter storms (George et. al 2004, Trenhaile

and Kanyaya 2007). Delays in sea ice formation prolong the exposure of coastlines to fall storms increasing the possibilities of major erosional events (USACE 2009, NAST 2000). Additionally, ice can serve as the primary haul out locations for sea mammals, particularly during feeding and pupping times (Kovacs et. al 2011, Blundell 2011). Losses in sea ice abundance, thickness, and iceberg size are all loss of habitat and can lead to species specific decreases in sea mammal populations.

Permafrost melt

Permafrost melt in the northern latitudes can cause resource impacts and loss or change in at least three direct actions: erosional slumping, inundation, and increased water flow (Schindler and Smol 2006, Hinkel et. al 2003). Erosional slumping causes direct loss of habitat. It can also provide a source of sedimentation in streams if the slump happens along a river. Erosional slumps can be very large and provide enough sediment to kill fish and remove habitat in impacted waters.

Because ice expands, when it melts, the volume ice occupied when frozen decreases. In the Arctic environment, this means that when permafrost melts, the underlying land subsides, often leaving large puddles and small shallow lakes (Osterkamp et. al 2000). Much of the vegetation in the Arctic overlies permafrost, and permafrost melt subsidence events inundate the vegetation and drown the biota (Jorgenson et. al 2001). In addition, because water is also an excellent conductor of heat, standing water that is touching ice will facilitate additional melt. This leads to continually increasing melt volume. Eventually the melt breaks out of the lake and reaches a stream, subsequently being drained through direct outflow or slumping (Smith et. al 2005, Jorgenson and Osterkamp et. al 2005). These episodic increases in water availability lead to increased water flow which cause erosion and localized alterations to physical aquatic and marine habitat and circulation characteristics (Bowden et. al 2008).

Erosion

Erosion is a major source of resource loss. Archaeological and historical sites in Alaska are abundant along the coasts and coastal streams. Increases in permafrost melt, sea level, and storm intensities, particularly when combined at critical times with the absence of historically protective sea ice, can lead to significant loss of sites along coastal areas (Lantuit and Pollard 2008). It is important to realize that these losses are occurring now at relatively high rates (Gorokhovich and Leiserowiz 2012, Mars and Houseknecht 2007). Furthermore, erosion is adversely impacting existing structures used for subsistence purposes within Park units. Additionally, erosion along the coastal margin is opening new areas to salt intrusion, thus altering habitat availability and compatibility with existing biological uses. These impacts affect both the plants and the animals that utilize these coastal areas.



Changing Sea Levels

Sea level rise is occurring at different rates across Alaska and is primarily caused by increased freshwater to the ocean through glacier melt, and secondarily through thermal expansion of seawater (Meier and Wahr 2002, Arendt et. al 2002)). In some areas the rate of increase is exceeded by the rate of land because of glacial loss rise (isostatic rebound), leading to a net decrease in relative sea level (Larsen et. al 2005). In other areas of Alaska sea level rise is occurring at relatively rapid rates (NOAA 2012) leading to coastal inundation and alterations of lagoon and wetland habitats through increased salinities. Rising sea levels can also impact the physical characteristics of nearshore circulation and cause increased opportunities for coastal erosional events (Hassol 2004).

Changes to stream peak flows and timing



All Alaskan national parks have significant coastal streams that provide habitat for many fish and invertebrate species. Changes in hydrological regime can present many issues for biota in the freshwater systems of Alaska (Prowse et. al 2006). Salmonids in particular are of high concern in these rivers because of their social and economic value, and as key role in the ecosystem, being a foodbase for both terrestrial and aquatic species (Gende et. al 2002). Because salmon are very site specific, even though they exist over a wide range of climate conditions, they have adapted to localized stream conditions for the waterways they migrate to for reproduction

(Farrell 2009). Alterations to the physical characteristics of the stream, including timing and intensities of peak flows may results in impacts to habitat availability for reproduction, timing of emergence, run timing, and freshwater residence timing (Battin et.al 2007). All of these potential effects can cause adverse impacts to the salmon populations on localized levels, and depending on severity, larger scales.

Loss of glaciers

Glaciers cover a significant portion of the Alaskan parks. Functionally they provide a source of freshwater to the nearshore environment. However, increases in water rates and flows can cause localized flooding and erosion, and increase localized ocean acidification rates and impacts. Additionally the weight loss of the glaciers on the land at such great scales is causing isostatic rebound, leading to decreases in the relative sea levels (Larsen 2005). This is potentially affecting wetlands that rely on inundation for habitat. The loss of glaciers also can expose new unvegetated land which can provide habitat for non-native species establishment (Emery 2010). Furthermore, some harbor seal populations rely on tidewater glaciers to calve icebergs on which they can haul out, pup, and nurse (Blundell 2011). As tidewater glaciers retreat, they eventually ground and no longer are able to provide ice for this function. When this happens, populations of harbor seals may likely decline.

Changes to wetlands

Wetlands are very susceptible to changes in water content. Increases in precipitation can cause flooding of wetlands (or vice versa), increases in sea level rise can cause salt intrusion, and changes in land level can cause wetlands to effectively lose freshwater sources or increase saltwater sources (Michener et. al 1997). Additionally, Arctic lakes can dry and disappear, leading to loss



of aquatic habitat (Smol and Douglas 2007, Hinkel et. al 2003). Functionally, this can create an imbalance in a delicate system that requires physical and biological characteristics to time appropriately for the ongoing support of wildlife in these systems. This can potentially bring significant attention to climate change as many wetlands in Alaska National Parks are nesting grounds for migratory birds, both of global and state significance (Smith 2010).

Precipitation changes

The intensity, form and timing of precipitation will likely change locally and regionally as a function of climatic change. Precipitation is a primary driving factor in ecosystem establishment, maintenance, and longevity. Because precipitation is a major driver in snowpack thickness, glacial expansion or retreat rates, snow level elevations, stream flow quantities and velocities, water availability, and wetland and nearshore salinity structure, it is extremely important what forms and what amounts arrive and when. Alterations to these events will have significant impacts on the ecosystem stability and ecosystem ability to provide sustainable subsistence while maintaining system functionality and integrity. Regardless of their direction and magnitude of change, they will likely impact the coastal and nearshore ocean environment in a myriad of currently not well understood ways.

Phenological changes

Some of the most important climate related issues revolve around phenological change (changes in timing of biological activities). Climate change brings with all of its complexities changes in the timing of plant growth and flowering to animal functions, from reproduction to migration. Because the ecosystems in Alaska have



evolved in an intricately tied way, changes in timing can lead to significant ecosystem changes. If animals don't show up at the proper time, food availability may not exist, reproductive conditions may not be favorable, or the physical conditions may not be advantageous to survival. This potential ecosystem imbalance sets the stage for species shifts through changes in migrational patterns, range expansion or contraction, survivability, exotic and invasive species establishment. Individual species response to climate change may directly impact or indirectly affect other species in the system at many trophic levels through food web interactions (Walther et al. 2002). Examples of this issue may be particularly apparent in salmon migration at times when food resources are low, or temperatures not optimal, further reducing survival (Dickerson et. al 2005); and in bird migration timing to wetlands at inopportune times when food availability or habitat conditions are sub-optimal leading to increased nest failures.

Increases in invasive species and species range expansions

As the combinations of climate change interactions and impacts to the Park systems occur, conditions become more suitable and opportune for new species to arrive. Increased habitat availability, more favorable climatic conditions, and increased transport opportunities can pave the way for exotic species to not only gain a foothold, but to functionally outcompete native species, leading to a new invasive species and increases in the invasive taxa abundance and distribution. When invasive species outcompete the native species, and the system becomes functionally altered and loss of diversity can occur. It is extremely important to remember that invasive species occur in the ocean, in lakes and streams, and in terrestrial systems, and can be plant, animal, and fungi. There are great concerns right now over the fungus causing white-nose syndrome in bats coming to Alaska.

Additionally, range expansion is another significant concern. Whether through legislated protection or climate change assisted habitat availability, the range of many species is expected to expand. The expansion of new species range into areas not previously inhabited can cause some significant ecological concerns that are similar to those of invasive species. The National Park Service has not yet identified how specifically to address range expansions from a management perspective.

Anthropogenic

Industry and development

Industrial development and operations around Alaska coastal parks poses significant long term threats to park systems. Road and infrastructure required for development causes long term (permanent) alterations to water flow dynamics, increases in human-animal interactions, increased access, as well as viewshed and soundscape impacts. Mining operations can produce fugitive dust with associated contaminants to the environment both locally and distributed from the transportation corridor. Oil operations can lead to oil spills.



Petroleum spills



With ongoing oil development in Alaska the potential for spills continues to increase. Most of the Alaskan national parks have long coastlines and very little infrastructure to adequately respond to a spill incident. While geographic response strategies have been developed and are up-to-date for most of our park areas, they do not address the larger issue of resource availability and functional operational limitations. Additionally, with limited information about much of our coastline, knowing the most sensitive areas to focus attention towards during a spill is based on best available information, which in

many locations is extremely limited. Several parks in the Alaska region have already been impacted by an oil spill. Potential impacts extend from acute wildlife loss to long term low level toxicity impacts of coastal areas. Furthermore, oil spills in ice conditions can lead to the transport of oil in difficult to predict areas and delayed response efforts.

Marine traffic

Marine traffic is a growing concern, particularly as the Arctic opens up to marine transportation. Increases in marine transportation lead to increases in opportunities for weather related marine traffic incidents including groundings and vessel strikes. Additionally, vessel strikes with marine mammals can lead to both human and marine mammal injury or death.



Marine debris

Marine debris brings pollution to the coasts of Alaskan national parks. Debris comes in many forms and includes toxins and hazardous materials (HAZMAT). These HAZMAT items pose risks to visitors as well as wildlife. Even items not classified as HAZMAT can pose health risks to both humans and animals. Marine debris can lead to wildlife entanglements and entrapments causing injuries, drowning, and starvation. Ingestion of non-digestible items such as plastics can lead to starvation. Additionally marine debris can bring invasive species. Events such as the 2011 Japanese tsunami disaster can increase marine debris levels and magnify these effects on coastal areas.

Hatcheries

In the state of Alaska there are several fish hatcheries primarily focused on salmon. The purpose of these fisheries is to enhance the availability of salmon for commercial (and recreational) purposes. However, the establishment of a hatchery fish run can overwhelm the natural run of fish in the area. It is not known what the biological or ecological consequences of this action are on the ecosystem.

Coastal use

Coastal use by humans in Alaska is a source of great visitation as well as increasing concern. Visitor use impacts to the coastal environment can potentially be significant. The possibility for negative wildlife-human interactions (bear, marine mammals, shorebirds, etc.) continues to increase with increasing visitation. Coastal use can lead to increases in trash and localized campsite impacts. Furthermore, the current understanding of human extraction of fish resources and their subsequent impact to the system in most parks is currently extremely limited.

Jurisdictional boundaries

One of the most important issues associated with Alaska National Parks revolves around jurisdictional boundaries. Much of the coastal work that the National Park Service is engaged in is limited by jurisdictional boundaries; certain park units such as KATM and KEFJ have “mean high tide and above” as their official park boundary on the coast. Because of these boundaries managers have been reluctant to commit resources to understanding areas beyond those bounds. However, the ecosystem does not recognize the same boundaries that humans do. Because of this, multiple state and federal agencies conduct operations and resource studies independent of one another. Recent federal policy has directed federal agencies to work together and has aided in this some, but the federal-state nexus is still unrealized in many crucial areas. Furthermore, to engage other federal agencies and optimize the opportunities available through the use of shared resources requires that support for extrajurisdictional work be authorized. This has generally not happened, and because of this, the ability of the National Park Service to obtain the information required to fully inform management in making scientifically supported resource decisions in relation to ocean and coastal resources has been inhibited.

AKRO Oceans and Coastal Program Operations

Regional Personnel: 1 - Tahzay Jones
 Operational budget after salaries and benefits: \$20,561

Budget:

Table 3. Oceans and Coastal programs project budget. Purposes are a brief description of the budgetary expense.

Total Cost	Purpose
\$2,878	KATM and ANIA marine debris coastal surveys
\$1,325	WRST aerial marine debris surveys
\$1,755	KEFJ aerial marine debris survey
\$500	KEFJ High resolution aerial imagery
\$2,535	SWAN sea otter isotope analysis
\$2,525	WEAR lagoon avifauna seasonal change study planning
\$4,246	Tahzay travel – Climate change scenario planning; GLBA, SITK, KLGO, and Juneau site visits for project planning
\$4,784	Safety trainings, other trainings, conference registration fees, safety equipment, and project field study equipment
\$20,548	Total

Accomplishment highlights:

The Alaska Region Oceans and Coastal program is now working in a collaborative partnership with the State of Alaska and other federal agencies for coordinated Japanese tsunami associated marine debris response. In coordination with the State of Alaska, NOAA (National Oceanic and Atmospheric Administration) and the FWS (U.S. Fish and Wildlife Service), the NPS in Alaska is currently conducting surveys and collecting information along NPS coastlines to enhance modeling efforts, test protocols, and to engage the State in determining locations and appropriate responses to hazardous debris sightings. Marine debris surveys have conducted in Katmai, Kenai Fjords, Wrangell-St.Elias, and Glacier Bay.

The NPS Oceans and Coastal program in Alaska wrote and is currently administering a contract for geo-referenced high resolution imaging, continuous video, and biological and physical characteristics mapping of the Northwest Arctic coastline from Point Hope to Point Wales. Funding for this project came from the FWS and NOAA in addition to in kind support from NOAA, FWS, the Bureau of Ocean and Energy Management (BOEM), and the Bureau of Land Management (BLM); as well as cooperation and support from the Alaska State Department of

Natural Resources, and the Nana regional corporation. These efforts were coordinated with BOEM to collect shore stations as ground truthing points for the biological and physical components of the mapping effort, tying into their efforts on the North Slope, effectively extending this project to the northern Canadian border. This project, ShoreZone, will complete in FY 2013.

The Arctic Inventory and Monitoring network (ARCIN) is developing a lagoon monitoring protocol for the Northwest Arctic in which the Oceans and Coastal Program is now heavily involved. Staff from the Oceans and Coastal Program participated in field efforts to test the existing pilot protocol, assess the feasibility of extending the protocol to Bering Land Bridge National Preserve, and determine alterations of the pilot protocol required to effectively develop a long term monitoring protocol for the lagoons in the Northwest Arctic Parklands.

In relation to climate change issues, the Alaska Region Oceans and Coastal Program (OCP), along with the Western Arctic Parklands Superintendent and a regional Archaeologist represented Alaska in attending the “Coastal Adaptation to Sea Level Rise” training at Western Carolina University. Issues related to coastal erosion in the Arctic and concerns facing Alaska National Parks in regards to this issue were discussed. In addition, OCP personnel attended climate change vulnerability training and led one session of vulnerability assessments based on harbor seals in Glacier Bay. The OCP program also attended a climate change scenario planning workshop by the Alaska Regional Office focused on Southeast Alaska and the impacts of climate change to the parks, land and communities of the area.

The Alaska Region Oceans and Coastal program was approached by a school in Utah about partnering with the National Park Service to integrate real life scenarios and situations facing land management agencies today into their curriculum (for math and sciences). The OCP program has agreed to work with the school in providing information that students can analyze and/or discuss to further their understanding of Arctic issues, climate change, and high latitude coastal challenges.

The Alaska Regional Ocean and Coastal Program has worked throughout this fiscal year to meet with coastal park managers and staff to develop a background of coastal related concerns, issues, and challenges each of the parks are facing with their resource management. Coastal prioritization of issues, park operational limitations, and support capabilities for external researchers have been evaluated for most of the coastal parks in the Alaska Region. Efforts are now initiated for a regional strategic approach towards providing parks with the assistance necessary to address individual park issues and to group multi-park issues to a regional level.

The Oceans and Coastal Program coordinator for Alaska participated in a management review of the Oceans Alaska Science and Learning Center. Several recommendations were made that include setting a framework for close cooperation between the Oceans Alaska Science and Learning Center and the Alaska Regional Oceans and Coastal Program. Furthermore, the OCP participated in the selection of the new learning center director.

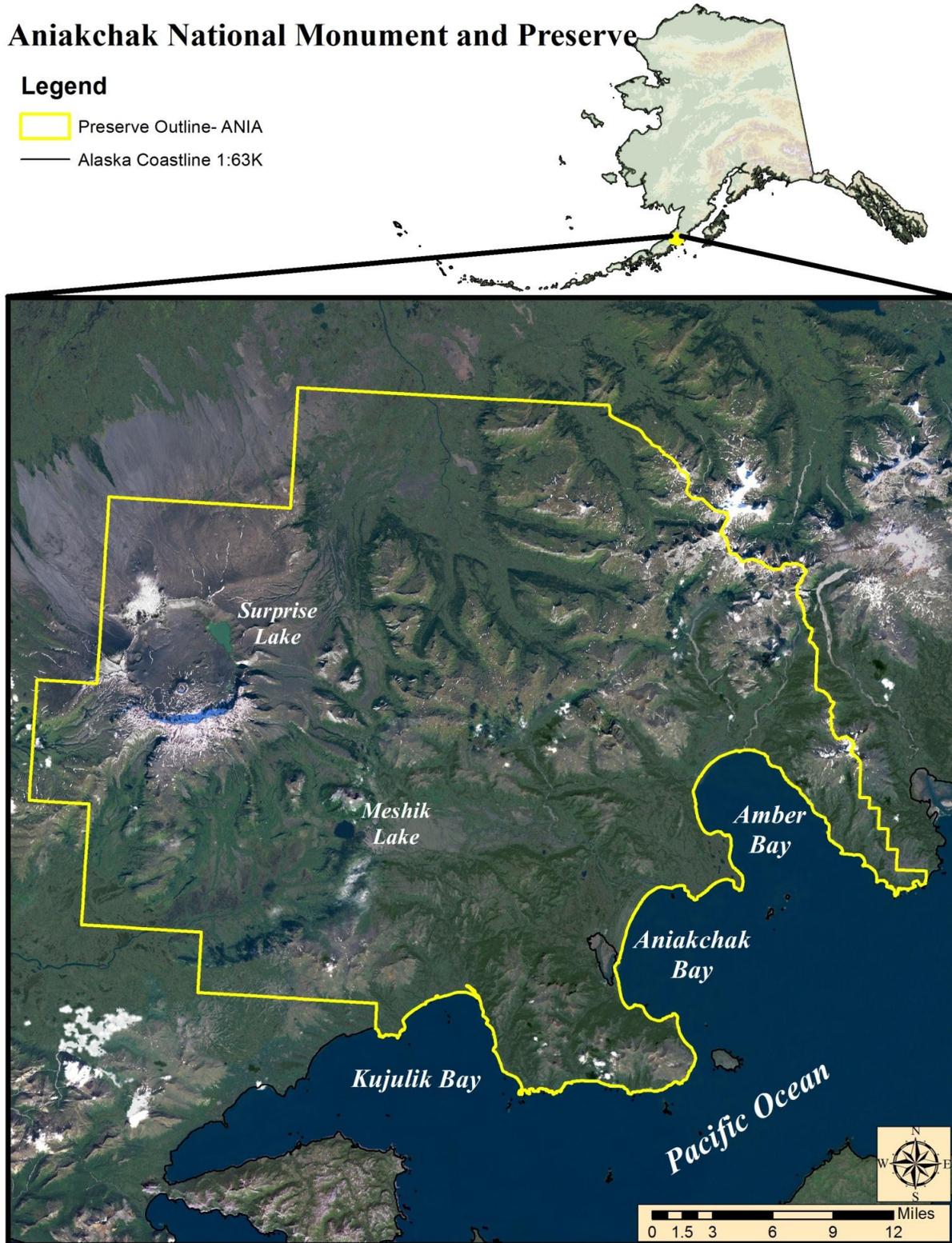
Individual Park Profiles

This section is intended to be a quick snapshot of each of the coastal national park units in the Alaska region. The purposes of this section are to inform the reader of current issues that are being considered and addressed by each of the coastal parks, and how they are addressing those issues. The sections contained under each park heading, are divided into a brief introduction to the park, the founding legislation for the park, a short list of threats the park currently faces, the projects they are working on this fiscal year, and their anticipated work for next fiscal year. These are short snapshots, and not intended to give the full history of the park, but rather to be a quick reference for what the parks are currently doing with relation to their enabling legislation. Furthermore, it is not anticipated that the list of threats be all inclusive. An exhaustive list of threats for each park is beyond the scope of this work, but rather this section is intended to illustrate and to some degree identify the more significant threats to the park system.

Aniakchak National Monument and Preserve

Legend

-  Preserve Outline- ANIA
-  Alaska Coastline 1:63K



Aniakchak National Monument and Preserve

ANIA is a 500,000+ acre park unit located 400 miles southwest of Anchorage on the Alaskan Peninsula and is accessible by plane and boat. It contains approximately 135 shoreline miles and significant coastal wetlands bordering Aniakchak and Amber Bays. The monument was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “to maintain the caldera and its associated volcanic features and landscape, including the Aniakchak River and other lakes and streams, in their natural state; to study, interpret, and assure continuation of the natural process of biological succession; to protect habitat for, and populations of, fish and wildlife, including, but not limited to, brown/ grizzly bears, moose, caribou, sea lions, seals, and other marine mammals, geese, swans, and other waterfowl and in a manner consistent with the foregoing, to interpret geological and biological processes for visitors. Subsistence uses by local residents shall be permitted in the monument.”

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact monument and preserve coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park; red (*Onocorhynchus nerka*) and pink (*Onocorhynchus gorbuscha*) salmon.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in ANIA as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

The prospect of a clam fishery is a significant concern to the coastal resources of this park. Many birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June. Clamming operations can both remove substantial portions of the available clams in the coastal area, as well as cause physical alterations to the dynamics of the system.

Ship groundings and their subsequent resource damage are of significant concern in this park. Aniakchak Bay is used as a safe harbor from storms by passing vessels. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges. Groundings have already occur on islands just off the coast; however as of yet there has been no significant resource damage to park resources.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources. Aniakchak coastal resources include petrified dinosaur tracks which could be damaged or destroyed by marine debris.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in ANIA, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

A technical assistance request was received and approved for attempting to determine the potential impacts of a clam fishery along the Aniakchak coast. The state is currently considering a permit for a clam fishery literally along the coast of Aniakchak Preserve. Because the Park has little information about the coastal system, it is unable to determine the potential impacts to a commercial clam fishery on the coast.

Physical

The park has temperature loggers in Surprise Lake, Aniakchak Creek and Albert Johnson Creek that monitor temperature year round and are downloaded once annually.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in ANIA has been identified at this time.

Human dimension

No human dimension ocean or coastal resources work in ANIA has been identified at this time.

Planned work within the Park

The work identified here is work ANIA has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

Current information on future coastal biological resource efforts in ANIA is not available at this time.

Physical

ANIA is currently listed as a park in the work plan for PMIS project 168715 which has been regionally approved and is competing for national ONPS funding. The project is titled Assessing and Mapping Marine Debris in Southwest Alaska Coastal Parks. This project is aimed at identifying marine debris buildup on coastal beaches, assess their impacts, target clean-up areas, and provide information to NOAA to further develop marine debris transport models. Major concerns are with damage to cultural and natural resources. If approved, funding would begin in FY 13.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No future chemical ocean or coastal resources work in ANIA has been identified at this time.

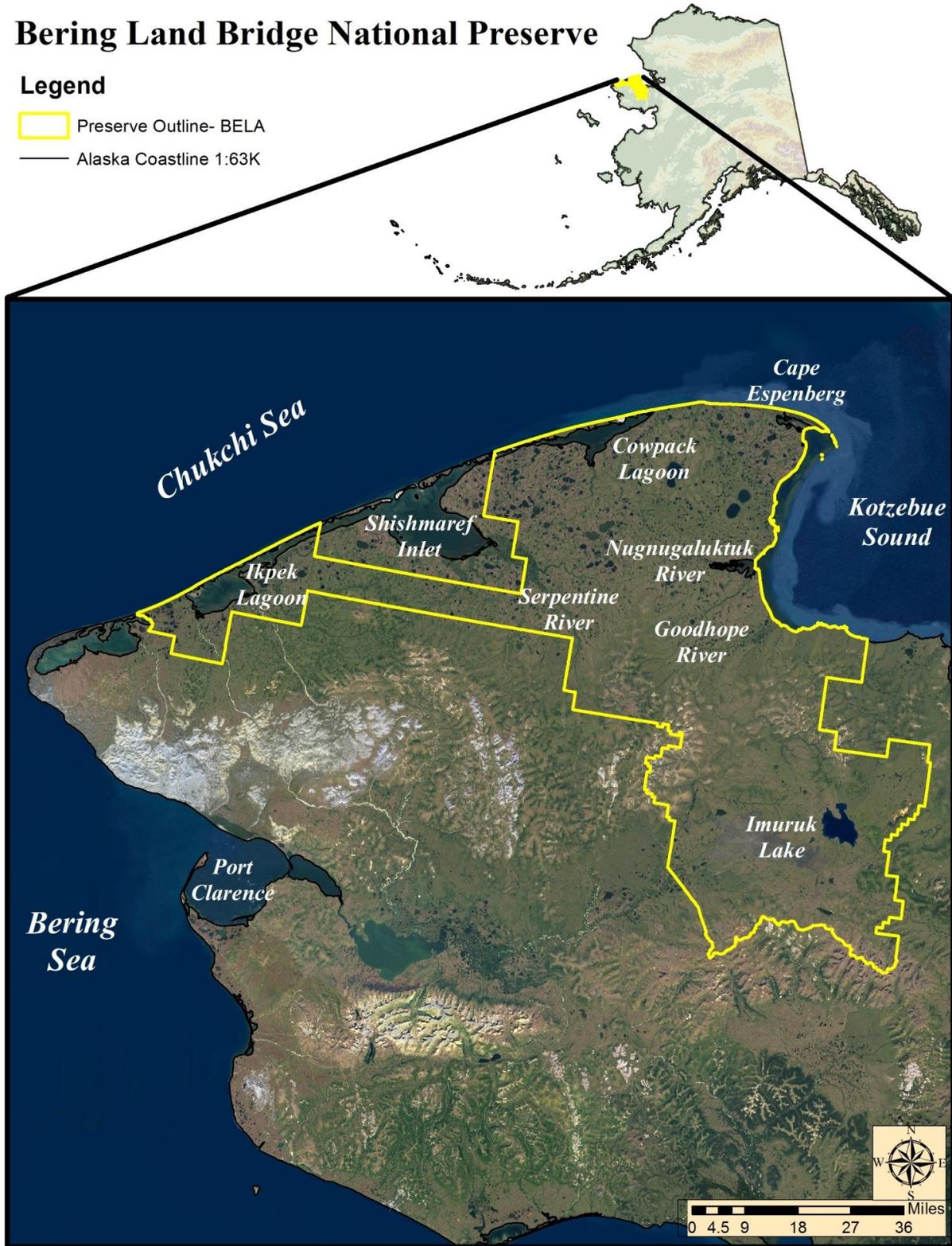
Human dimension

No future human dimension ocean or coastal resources work in ANIA has been identified at this time.

Bering Land Bridge National Preserve

Legend

-  Preserve Outline- BELA
-  Alaska Coastline 1:63K



Bering Land Bridge National Preserve

BELA is a 2,450,000+ acre park unit located 550 miles northwest of Anchorage and 100 miles north of Nome, on the Seward Peninsula and is accessible by plane and boat. It contains approximately 571 shoreline miles and significant coastal wetlands and lagoons almost the entire length of the north and northwest borders of the park from Ikepek Lagoon to the eastern borders of the Goodhope River. The monument was established by ANILCA.

Enabling Legislation

Enabling legislation states the Preserve shall be managed “To protect and interpret examples of arctic plant communities, volcanic lava flows, ash explosions, coastal formations and other geologic processes; to protect habitat for internationally significant populations of migratory birds; to provide for archeological and paleontological study, in cooperation with Native Alaskans, of the process of plant and animal migration, including man, between North America and the Asian Continent, to protect habitat for, and populations of, fish and wildlife including, but not limited to, marine mammals, brown/grizzly bears, moose and wolves; subject to such reasonable regulations as the Secretary may prescribe, to continue reindeer grazing use, including necessary facilities and equipment, within the areas which on January 1, 1976, were subject to reindeer grazing permits, in accordance with sound range management practices; to protect the viability of subsistence resources; and in a manner consistent with the foregoing, to provide for outdoor recreation and environmental education activities including public access for recreational purposes to the Serpentine Hot Springs area”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact preserve coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of phytoplankton available to the food chain, to the macrofauna and invertebrate populations, to the apex predators, the ramifications of ocean acidification can be severe. As birds, fish and mammals rely on coastal resources, the impacts from decreased productivity through acidification can significantly impact populations of fauna as well as subsistence use practices preserved in the founding legislation.

Temperature increases in the surface water. Temperature increases will have unknown impacts to the system through species range expansion and loss. Temperature increases will increase the rate of sea ice loss and formation. These changes can potentially cause a loss of shoreline protection from storms, leading to subsequent erosion, habitat loss, sediment suspension, and deposition. Sea ice dependent species may tend to migrate northward with the ice, reducing presence within the park.

Permafrost melt with increasing climatic temperatures is a significant concern. Areas of slumping from permafrost melt are already seen along coastal margins within the Park. Inland permafrost melt can lead to the formation of additional streams and stream flow, increasing erosion. Additionally, the increase in freshwater input into the lagoon systems may cause a

change in the physical characteristics of the lagoon system in the Northwest area of the Park and along the entire northwest side of the Seward Peninsula. These changes can potentially affect the functioning of the system and the migratory birds that are associated with it.

Erosion is a significant concern along the entire coastal margin of the park. Erosion is already occurring at a rapid rate and is having both cultural and natural resource effects. Natural resources include the erosion of barrier islands, increased thaw rates of coastal permafrost, and land loss. Cultural resource impacts include changes to, damage, and loss of historical sites, subsistence structures, and subsistence use patterns.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Increases in marine shipping through the Arctic are opening these parks up to a significant increase in risk associated with the spread of marine invasives.

The aquatic invasive *Elodea* is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in BELA as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

The Chukchi Sea is home to tremendous reserves of oil and gas. Oil and gas exploration is currently underway on inholdings near BELA's sensitive Cape Espenberg, while Chukchi Sea drilling leases have been awarded with exploration due to begin in summer 2012. Increasing marine shipping and mounting impacts of climate change make the coastline vulnerable to anthropogenic change.

Marine transportation is increasing off the coastline, exploiting new Arctic Ocean shipping lanes and supporting growing communities in northwest Alaska. Fuel transport occurs via fuel barges navigating and anchoring in the shallow waters near shore, in close proximity to the entire Preserve coastline. Marine debris and contaminant spill accidents are a concern. BELA does not have a baseline data layer of sensitive coastal habitats and species. Incomplete mapping of coastal zone resources prevents effective spill response planning and execution, impacts the quality of research projects, and complicates resource management.

Ship groundings and their subsequent resource damage are of significant concern in this park. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges. Strandings due to engine failures and groundings have already occur in nearby areas; however as of yet there has been no significant resource damage to park resources.

General marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources. This is an ongoing concern and is expected to increase with increased shipping and commercial traffic due to reduced sea ice seasonal extent.

Motorized vehicle use along the beaches of the northwest region of the park may enhance erosion and damage natural and cultural resources. This use is consistent with subsistence use practices and currently allowed within Park boundaries.

Proposed plans to move the village of Shishmaref from its eroding barrier island to the interior of the Arctic Lagoon complex in the Shishmaref Inlet, yield many concerns with contaminant spill and retention in the system and marine debris damage. Current vectors within the lagoon complex are unknown.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in BELA, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The ARCN lagoon monitoring protocol pilot was implemented in July of this year. The Lagoon monitoring protocol pilot focused on biological components of the lagoon system in both Ikpek and Cowpack lagoons. Lagoon monitoring included plankton tows, fish sampling, macroinvertebrate sampling, and physical water quality parameters.

The ARCN yellow billed loon monitoring program took place this summer. Yellow billed loon surveys were conducted throughout the coastal areas of the park, and obtained information on all waterfowl identified during the surveys targeted in yellow billed loon habitat.

Musk ox surveys were conducted along the BELA coast this year. This project aims to identify and quantify the musk ox populations in BELA. This work includes both coastal and inland musk-ox locations based on radio collar transmitters affixed to the animals.

Physical

PMIS 185597 has received regional funding to proceed. This project is titled: Gathering a Pre-Spill Baseline for BELA/CAKR Prior to Potential Oil Spills using Shorezone Protocol. The project included aerial imagery (still and video) along the entire shoreline, including the lagoon systems within the park. These images included documentation of the physical and biological characteristics of the shoreline (and were subsequently ground-truthed through ShoreStations). This data will be put on the web in FY13 at the ShoreZone site to make this documentation available to the public (<http://mapping.fakr.noaa.gov/szflex/> and shorezone.org)

ShoreStation work was implemented in conjunction with PMIS project 185597 this summer. This work included taking shoreline profiles and documenting the biological and geomorphological components of the beach in 13 locations throughout BELA.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in BELA has been identified at this time.

Human dimension

No human dimension ocean or coastal resources work in BELA has been identified at this time.

Planned work within the Park

The work identified here is work BELA has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

Musk-ox and Yellow billed loon monitoring as part of the ARCN monitoring program is planned to continue to place in future years.

A project to determine lagoon seasonal biological and physical dynamics is currently being planned for FY13. This project will examine seasonal bird and fish population movements, physical water quality changes, and outlet discharge characteristics in Ikpek lagoon during the summer season.

PMIS 186476 has received regional funding to proceed. This project is titled: Aerial Surveying of Staging Shorebirds on CAKR and BELA Coasts Prior to Oil Development. This project focuses on doing a full survey of the shorebirds along the NPS Northwest arctic coasts, lagoons inclusive. Because recent oil leases are now active and beginning exploratory drilling in the Chukchi, the park is trying to gain at least a snapshot of the avian fauna, prior to any impacts from those efforts. FWS surveys do not include all of the NPS coastal area. Planned implementation is FY 13.

PMIS 186377 has received regional funding to proceed. The project is titled: Synthesis of historical and contemporary information on the avian fauna of CAKR and BELA. This project is focused on analyzing the data collected from previous bird studies in the parks that have not been published, and synthesize them. In addition, another partner is working to synthesize efforts for similar work done on the Russian side of Beringia (with separate funding). These two products are then going to be synthesized together. Planned implementation is FY 14.

PMIS 186815 has received regional funding to proceed. This project is titled: Use SAR imagery to assess lake freezing in habitat for fish and yellow-billed loons: CAKR and BELA. Yellow billed loons are a candidate endangered species with determination scheduled no later than FY15. A significant portion of the world population is known to use CAKR and BELA for nesting, particularly the lagoon areas and coastal lakes. The project is trying to identify specific areas where habitat suitability for the fish is conducive to their survival and thus support the prey species for the loons. Planned implementation is FY 15.

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR). This project is not yet approved.

Physical

PMIS 185597 has received regional funding to proceed. This project is titled: Gathering a Pre-Spill Baseline for BELA/CAKR Prior to Potential Oil Spills using Shorezone Protocol. The project included aerial imagery (still and video) along the entire shoreline, including the lagoon systems within the park. These images included documentation of the physical and biological characteristics of the shoreline (and were subsequently ground-truthed through ShoreStations) and were completed in FY12. This data will be put on the web in FY13 at the ShoreZone site to make this documentation available to the public (<http://mapping.fakr.noaa.gov/szflex/> and shorezone.org)

PMIS 186604 has received regional funding to proceed. The project is titled Development of an Arctic Parks Coastal Resource Synthesis. This project is targeted at compiling coastal information that has been gathered on the BELA and CAKR coastal areas specifically. Planned implementation is FY 13.

The ARCN lagoon monitoring protocol will be collecting physical water quality parameters during the “off” years from the biological monitoring that takes place once every 5 years.

The ARCN coastal erosion monitoring protocol is set to cycle in once again in FY13. This project aims to document the coastal erosion through satellite imagery once per decade to understand the rates of erosion and deposition along the entire coast of BELA and CAKR.

An agreement with the University of Alaska’s Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

PMIS 186586 has moved to national competition for funding. This project is titled: Assessment of Contaminant Concentrations in Yellow-billed Loons: CAKR and BELA. The goal of the project is to assess the contaminant concentrations in the loons. The major concern is because yellow billed loons are bioaccumulators, and winter in less contaminant restricted Asian nations, many of our yellow billed loons may carry contaminant loads that are unsafe for human consumption. Because bird eggs are a primary subsistence source in the area, the NPS would like to know if contaminant loads in their eggs will present a significant health hazard. If funded, this project has a planned implementation of FY 13.

Chemical

No future chemical ocean or coastal resources work in BELA has been identified at this time.

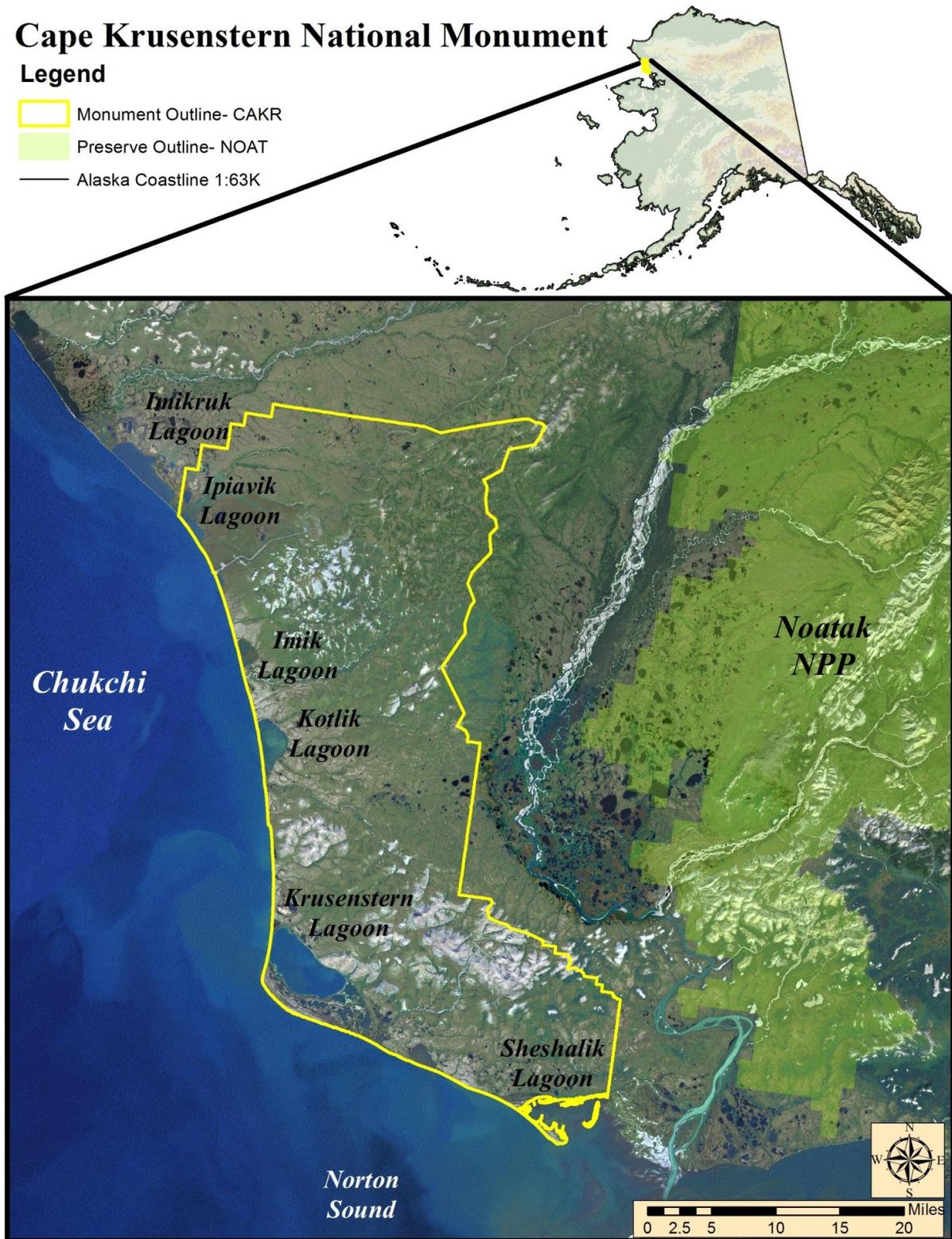
Human dimension

No future human dimension ocean or coastal resources work in BELA has been identified at this time.

Cape Krusenstern National Monument

Legend

-  Monument Outline- CAKR
-  Preserve Outline- NOAT
-  Alaska Coastline 1:63K



Cape Krusenstern National Monument

CAKR is a 560,000+ acre park unit located 580 miles northwest of Anchorage and 10 miles north of Kotzebue, on the Northwest Alaska coast and is accessible by plane and boat. It contains approximately 375 shoreline miles and significant coastal wetlands and lagoons almost the entire length of the western and southern borders of the park from Ipiavik Lagoon in the north to Sheshalik Lagoon in the south. The monument was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “To protect and interpret a series of archeological sites depicting every known cultural period in arctic Alaska; to provide for scientific study of the process of human population of the area from the Asian Continent, in cooperation with Native Alaskans, to preserve and interpret evidence of prehistoric and historic Native cultures, to protect habitat for seals and other marine mammals; to protect habitat for and populations of, birds, and other wildlife, and fish resources; and to protect the viability of subsistence resources. Subsistence uses by local residents shall be permitted in the monument”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact preserve coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of phytoplankton available to the food chain, to the macrofauna and invertebrate populations, to the apex predators, the ramifications of ocean acidification can be severe. As birds, fish and mammals rely on coastal resources, the impacts from decreased productivity through acidification can significantly impact populations of fauna as well as subsistence use practices preserved in the founding legislation.

Temperature increases in the surface water. Temperature increases will have unknown impacts to the system through species range expansion and loss. Temperature increases will increase the rate of sea ice loss and formation. These changes can potentially cause a loss of shoreline protection from storms, leading to subsequent erosion, habitat loss, sediment suspension, and deposition. Sea ice dependent species may tend to migrate northward with the ice, reducing presence within the park.

Permafrost melt with increasing climatic temperatures is a significant concern. Areas of slumping from permafrost melt are already seen along coastal margins within the Park. Inland permafrost melt can lead to the formation of additional streams and stream flow, increasing erosion. Additionally, the increase in freshwater input into the lagoon systems may cause a change in the physical characteristics of the lagoon system in the Northwest area of the Park and along the entire northwest side of the Seward Peninsula. These changes can potentially affect the functioning of the system and the migratory birds that are associated with it.

Erosion is a significant concern along the entire coastal margin of the park. Erosion is already occurring at a rapid rate and is having both cultural and natural resource effects. Natural resources include the erosion of barrier islands, increased thaw rates of coastal permafrost, and land loss. Cultural resource impacts include changes to, damage, and loss of historical sites, subsistence structures, and subsistence use patterns.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Increases in marine shipping through the Arctic are opening these parks up to a significant increase in risk associated with the spread of marine invasives.

The aquatic invasive *Elodea* is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in CAKR as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

The Chukchi Sea is home to tremendous reserves of oil and gas. Oil and gas exploration is currently underway on inholdings in nearby Cape Espenberg, while Chukchi Sea drilling leases have been awarded with exploration due to begin in summer 2012. Increasing marine shipping and mounting impacts of climate change make the coastline vulnerable to anthropogenic change.

Marine transportation is increasing off the coastline, exploiting new Arctic Ocean shipping lanes and supporting growing communities in northwest Alaska. Fuel transport occurs via fuel barges navigating and anchoring in the shallow waters near shore, in close proximity to the entire Preserve coastline. Marine debris and contaminant spill accidents are a concern. CAKR does not have a baseline data layer of sensitive coastal habitats and species. Incomplete mapping of coastal zone resources prevents effective spill response planning and execution, impacts the quality of research projects, and complicates resource management.

Ship groundings and their subsequent resource damage are of significant concern in this park. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges. Strandings due to engine failures and groundings have already occur in nearby areas; however as of yet there has been no significant resource damage to park resources.

General marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources. This is an ongoing concern and is expected to increase with increased shipping and commercial traffic due to reduced sea ice seasonal extent.

Motorized vehicle use along the beaches of the northwest region of the park may enhance erosion and damage natural and cultural resources. This use is consistent with subsistence use practices and currently allowed within Park boundaries.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a

comprehensive listing of all work being accomplished in CAKR, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The ARCN lagoon monitoring protocol pilot was implemented in July of this year. The Lagoon monitoring protocol pilot focused on biological components of the lagoon system in Kotlik, Krusenstern, and Akulaaq lagoons. Lagoon monitoring included plankton tows, fish sampling, macroinvertebrate sampling, and physical water quality parameters.

The ARCN lagoon monitoring protocol was implemented in July of this year. The Lagoon monitoring protocol will focus on biological components of the lagoon system in both Ipiavik, Kotlik, Krusenstern, and Sheshalik lagoons. Monitoring will include plankton tows, fish sampling, and macroinvertebrate sampling. As well as some physical characteristics.

The ARCN yellow billed loon monitoring program took place this summer. Yellow billed loon surveys were conducted throughout the coastal areas of the park, and obtained information on all waterfowl identified during the surveys targeted in yellow billed loon habitat.

Musk ox surveys were conducted along the CAKR coast this year. This project aims to identify and quantify the musk ox populations in CAKR. This work includes both coastal and inland musk-ox locations based on radio collar transmitters affixed to the animals.

Physical

PMIS 185597 has received regional funding to proceed. This project is titled: Gathering a Pre-Spill Baseline for BELA/CAKR Prior to Potential Oil Spills using Shorezone Protocol. The project included aerial imagery (still and video) along the entire shoreline, including the lagoon systems within the park. These images included documentation of the physical and biological characteristics of the shoreline (and were subsequently ground-truthed through ShoreStations) and were completed in FY12. This data will be put on the web in FY13 at the ShoreZone site to make this documentation available to the public (<http://mapping.fakr.noaa.gov/szflex/> and shorezone.org)

ShoreStation work was implemented in conjunction with PMIS project 185597 this summer. This work included taking shoreline profiles and documenting the biological and geomorphological components of the beach in approximately 6 locations throughout CAKR.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in CAKR has been identified at this time.

Human dimension

No human dimension ocean or coastal resources work in CAKR has been identified at this time.

Planned work within the Park

The work identified here is work CAKR has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

Musk ox and Yellow billed loon monitoring as part of the ARCN monitoring program is planned to continue in future years.

PMIS 186476 has received regional funding to proceed. This project is titled: Aerial Surveying of Staging Shorebirds on CAKR and BELA Coasts Prior to Oil Development. This project focuses on doing a full survey of the shorebirds along the NPS Northwest arctic coasts, lagoons inclusive. Because recent oil leases are now active and beginning exploratory drilling in the Chukchi, the park is trying to gain at least a snapshot of the avian fauna, prior to any impacts from those efforts. FWS surveys do not include all of the NPS coastal area. Planned implementation is FY 13.

PMIS 186377 has received regional funding to proceed. The project is titled: Synthesis of historical and contemporary information on the avian fauna of CAKR and BELA. This project is focused on analyzing the data collected from previous bird studies in the parks that have not been published, and synthesize them. In addition, another partner is working to synthesize efforts for similar work done on the Russian side of Beringia (with separate funding). These two products are then going to be synthesized together. Planned implementation is FY 14.

PMIS 186815 has received regional funding to proceed. This project is titled: Use SAR imagery to assess lake freezing in habitat for fish and yellow-billed loons: CAKR and BELA. Yellow billed loons are a candidate endangered species with determination scheduled no later than FY15. A significant portion of the world population is known to use CAKR and BELA for nesting, particularly the lagoon areas and coastal lakes. The project is trying to identify specific areas where habitat suitability for the fish is conducive to their survival and thus support the prey species for the loons. Planned implementation is FY 15.

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR). This project is not yet approved.

Physical

The ARCN lagoon monitoring protocol will be collecting physical water quality parameters during the “off” years from the biological monitoring that takes place once every 5 years.

The ARCN coastal erosion monitoring protocol is set to cycle in once again in FY13. This project aims to document the coastal erosion through satellite imagery once per decade to understand the rates of erosion and deposition along the entire coast of BELA and CAKR.

PMIS 185597 has received regional funding to proceed. This project is titled: Gathering a Pre-Spill Baseline for BELA/CAKR Prior to Potential Oil Spills using Shorezone Protocol. The

project included aerial imagery (still and video) along the entire shoreline, including the lagoon systems within the park. These images included documentation of the physical and biological characteristics of the shoreline (and were subsequently ground-truthed through ShoreStations) and were completed in FY12. This data will be put on the web in FY13 at the ShoreZone site to make this documentation available to the public (<http://mapping.fakr.noaa.gov/szflex/> and shorezone.org)

PMIS 186604 has received regional funding to proceed. The project is titled Development of an Arctic Parks Coastal Resource Synthesis. This project is targeted at compiling coastal information that has been gathered on the BELA and CAKR coastal areas specifically. Planned implementation is FY 13.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No future chemical ocean or coastal resources work in CAKR has been identified at this time.

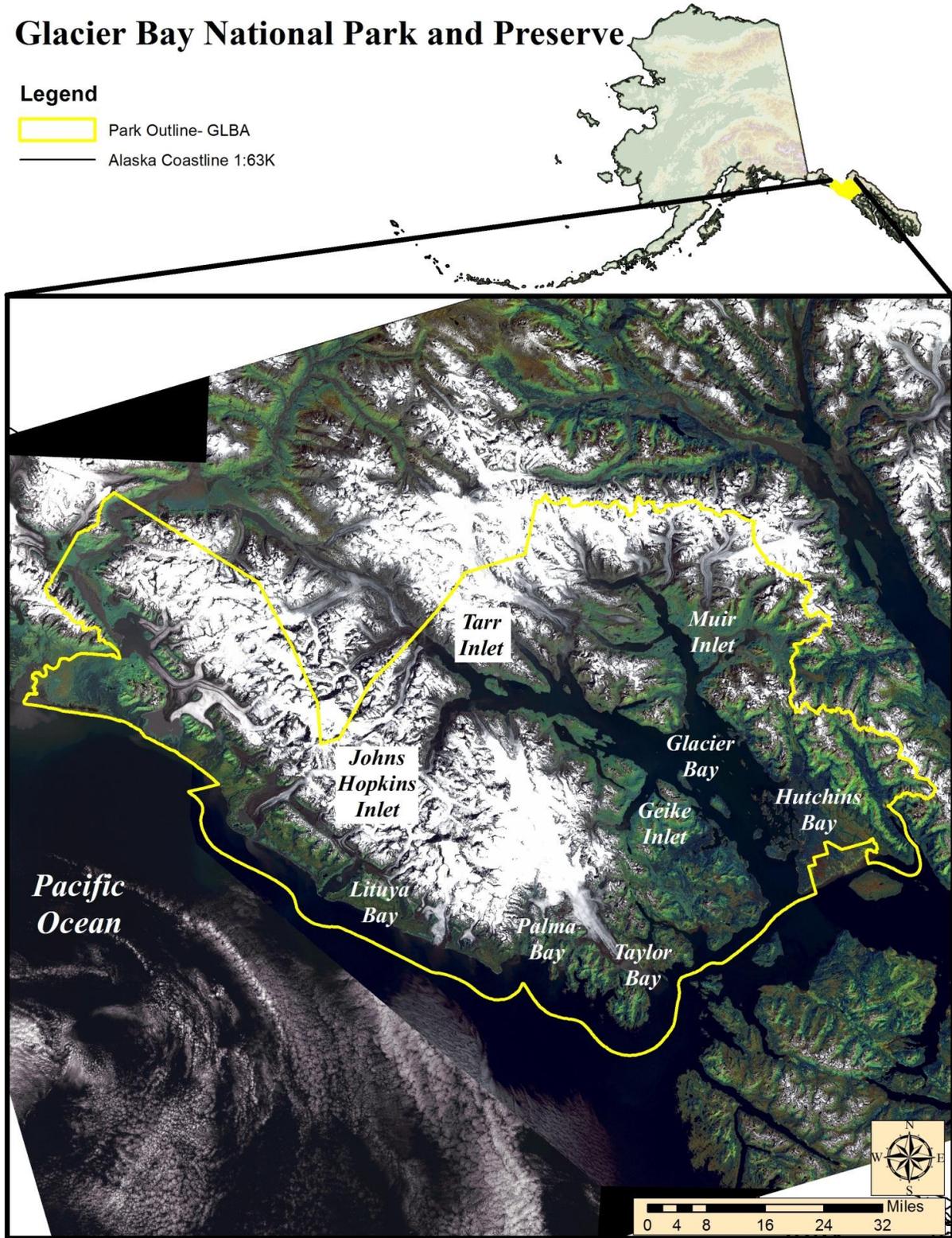
Human dimension

No future human dimension ocean or coastal resources work in CAKR has been identified at this time.

Glacier Bay National Park and Preserve

Legend

-  Park Outline- GLBA
-  Alaska Coastline 1:63K



Glacier Bay National Park and Preserve

GLBA is a 3,280,000+ acre park unit located 475 miles southeast of Anchorage and 45 miles west of Juneau, on the Northwest Alaska coast and is accessible by plane and boat. It contains approximately 1179 shoreline miles and 598,000+ acres of marine habitat throughout the park. The monument was established presidential proclamation in 1925 and expanded multiple times, with the last being ANILCA in 1980.

Enabling Legislation

Enabling legislation through presidential proclamation 1733 (with size modifications from presidential proclamation 2330 and 3089) states the monument and preserve shall be managed because there are “a number of tidewater glaciers of the first rank in a magnificent setting of lofty peaks, and more accessible to ordinary travel than other similar regions of Alaska; the region is said by the Ecological Society of America to contain a great variety of forest covering consisting of mature areas, bodies of youthful trees that have become established since the retreat of the ice, which should be preserved in absolutely natural condition, and great stretches now bare that will become forested in the course of the next century; this area presents a unique opportunity for the scientific study of glacial behavior and of resulting movements and development of flora and fauna and of certain valuable relics of ancient interglacial forests; the area is also of historic interest having been visited by explorers and scientists since the early voyages of Vancouver in 1794, who have left valuable records of such visits and explorations”.

Additional enlargement added more enabling legislation through presidential proclamation 4618 and includes “the highest peak in this part of Alaska, and the Grand Plateau Glacier, both significant to students of glaciology.” In addition, “The Alsek River corridor provides the only pass through the coastal mountain range for 120 miles. This is the route by which large mammals first entered this isolated area and is used by a significant percentage of the Alaska bald eagle population en route to the Klukwan area where they winter. The addition also protects two botanically significant areas. In the hills flanking Grand Plateau Glacier live the oldest plant communities in southeast Alaska which survive because the area escaped both glaciation and inundation. Also important to the study of ecological succession are the mature aquatic vegetative communities of the pre-neoglacial lakes in the Deception Hills area. The land withdrawn and reserved by this Proclamation for the protection of the geological, biological, and other phenomena enumerated above supports now, as it has in the past, a unique subsistence culture of the local residents. The continued existence of this culture, which depends on subsistence hunting, and its availability for study, enhances the historic and scientific value of the natural objects protected herein because of the ongoing interaction of the subsistence culture with those objects. Accordingly, the opportunity for local residents to engage in subsistence hunting is a value to be protected and will continue under the administration of the area added to the Glacier Bay National Monument”.

ANILCA expansion legislation states the addition of the preserve shall be managed “to protect a segment of the Alsek River, fish and wildlife habitats and migration routes and a portion of the Fairweather Range including the northwest slope of Mount Fairweather”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact preserve coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of phytoplankton available to the food chain, to the macrofauna and invertebrate populations, to the apex predators, the ramifications of ocean acidification can be severe. As birds, fish and mammals rely on coastal resources, the impacts from decreased productivity through acidification can significantly impact fauna populations as well as subsistence use practices preserved in the founding legislation.

Temperature increases in the surface water. Temperature increases will have unknown impacts to the system through species range expansion and loss. Additionally, increases in temperatures will increase the rate of iceberg melting, reducing time availability of each ice mass for seal use.

Increasing climatic temperatures is a significant concern. Increased temperatures are causing increases in glacier retreat. A potential critical ecosystem tipping point is the point at which a glacier retreats onto land and is no longer a tidewater glacier. This change can have significant impacts to the system, particularly ice dependent marine mammals.

Changes in freshwater run-off and the hydrological regime resulting from climatic change is of ecological concern. These changes can have unanticipated impacts to the local system in which they are a function. These changes can include timing and rate of peak water flows and can lead to increases in erosion, structural damage, and habitat loss as well as reducing biological populations.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive. Invasive tunicates are already found in Sitka Sound and farther north while European green crabs have not quite made it into Alaska.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in GLBA as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

The harvesting of glaucous-winged gull eggs for traditional subsistence use is a significant concern. Pending legislation is leading GLBA to proactively approach data gathering to develop a harvest plan for this important natural and cultural resource. Appropriate harvest locations are difficult to identify because of marine mammal concerns and compliance with the marine mammal protection act, leading GLBA into a potentially challenging legal issue of compliance with all applicable laws. Furthermore, developing appropriate harvest limitations (when and

where) requires documented information the Park does not currently possess to adequately determine the appropriate restrictions.

Traditionally harvested sites for gulls are a major concern for the Park because of the distribution of sea lions and harbor seals, as well as the issue of motorized access to currently designated non-motorized waters. Currently there are no potential landing sites for egg harvest because of the distribution of marine mammals and disturbance issues. Consultation with NOAA fisheries continues to be needed as well as the potential issuance of take permits. Ultimately, with the delisting of sea lions, harbor seals may be the larger issue. However, the harvesting legislation currently stalled in congress, if passed, may force the issue of legally, with compliance to all applicable laws, determining potential harvest islands and harvest locations with access.

Vessel traffic is a significant concern within the park. Cruise ships can cause both disturbances and strikes to marine mammals within the park as well as causing air pollution with associated air quality impacts. Air and small boat traffic can also impact both marine and terrestrial wildlife through visual and sound disturbances.

Ship groundings and their subsequent resource damage are of significant concern in this park. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges. Strandings due to engine failures and groundings have already occurred in the park and nearby areas.

Fishing impacts to park resources are unknown, but potentially significant. These impacts could be to the fishermen, local populations, native populations, and to the wildlife supported by the fisheries. In combination with natural forces currently acting on the system, the impacts of sustained high yield fisheries could be significant.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in GLBA, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The SEAN network conducted Kittletz's Murrelet and oceanography monitoring studies in Glacier Bay. Kittletz's Murrelet populations are also being monitored in Icy Bay in Wrangell- St. Elias NPP.

NPS and the Fish and Wildlife Service conducted research on habitat use of Kittletz's Murrelets to provide information to conservation and background information for the potential threatened or endangered species listing recommendation.

GLBA worked on a project to monitor populations of glaucous-winged gulls with the ultimate goal of developing a harvest plan for the resource. However, the immediate concerns of the park

and purposes of the gull studies are to determine when and where to harvest by determining egg laying synchronicity, colony size, productivity (eggs available to hatch), and fledging success.

GLBA continued with an established a marine invasives monitoring program in Bartlett Cove focused on the European green crab (*Carcinus maenas*) and Japanese tunicate (*Didemnum vexillum*). These two marine invasives are potentially carried by ship traffic, and therefore have the greatest potential for dispersal through the cruise ship tourism vector.

GLBA continued to monitor marine mammal - vessel interactions throughout the Bay. This work was focused entirely within the Bay and is vessel based. Additionally, work is progressing in expanding the monitoring program prior to reaching Bartlett Cove. Recognizing that a significant portion of the population of marine mammals in Glacier Bay affected by cruise ship traffic may be occurring before reaching Bartlett Cove, progress is being made towards expanding vessel based monitoring prior to arrival in Bartlett Cove with cooperation from the University of Montana.

A cooperative agreement with the University of Washington to look at genetics of humpback whales and the potential colonization of Glacier Bay from different genetic groups was developed. This is a 2 year study using data that has already been collected.

GLBA continued support for harbor seal research focused on available ice habitat in John Hopkins inlet. The focus question for the seal work is: Is there ice habitat limitation for seals in Glacier Bay? This work is being done using remote sensing and in partnership with the University of Alaska, Fairbanks.

Harbor seal monitoring to understand distribution and abundance of harbor seals using terrestrial and aerial techniques is ongoing within Glacier Bay.

An acoustic sonar project on Bartlett River focused on recreational fishing pressure took place. The project aims to estimate Coho escapement upriver from where the majority of fishing occurs.

GLBA received assistance through two technical assistance requests to address fishing issues within the Park. They are titled: Develop verifiable, statistically robust creel sampling approach to estimating recreational fishery harvest in Glacier Bay National Park; and Determine recreational halibut harvest threshold for Glacier Bay National Park. These are currently being addressed with the purpose to define a harvest threshold for halibut and ultimately clarify reporting requirements for GLBA.

Physical

GLBA is working to establish and update the Coastwalker database to be online for general access by the public and other interested entities. This is not currently available for rapid external access, particularly in the event of an oil spill or grounding. Work this year focused on reworking the front-end access to the database in preparation for publication.

GLBA conducted a paleogeomorphology study to identify ancient shorelines on the outer coast of the Park with the purpose to eventually look at a historical potential coastal travel routes and locations to target for future archaeological studies.

GLBA is working with the WASO Natural Sounds and Night Skies Division to develop a sound monitoring program. There is currently a draft monitoring plan being reviewed for management issues.

GLBA monitored administrative vessel use. Growing concerns over GLBA regulation of administrative vessel use drove this project. Vessel traffic is closely monitored within the sciences, but other uses are still an issue. GLBA is identifying who is out, how frequently, how long, and purposes.

GLBA is conducting coastal campsite assessments for the purpose of refining the current coastal camping protocols and to understand the social and biophysical impacts camping is having on the coastal resources. This project is focused on determining if impacts are primarily rock rings and trash or if there are more significant vegetation and wildlife impacts the Park needs to be concerned about.

The Alaska Regional Inventory and Monitoring program developed a contract to acquire an updated digital elevation map data for all of GLBA. Work will proceed in FY13.

There is an ongoing sound project in Bartlett Cove utilizing a hydrophone to collect underwater acoustics information. The purpose is to collect ongoing ambient sound information, particularly in reference to marine mammal vocalizations and anthropogenic noise.

Impact research projects to air quality resulting from cruise ships are in early phases of project development. However, growing concerns over environmental impacts from cruise ships, particularly to air quality are growing, and understanding the current and potential impacts is important.

High quality satellite imagery (IKONOS) for the entire GLBA park was acquired by the regional inventory and monitoring program. This imagery will be used to update the current ortho-imagery that is being used by the park.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

A pCO₂ monitoring program for GLBA was conducted by the University of Alaska Fairbanks to understand the spatial variability of dissolved CO₂ throughout the marine interior of the park. The work is a 3 year study being conducted by Jeremy Mathis and Stacy Reisdorf.

PMIS project 139290 titled Mercury dynamics in contrasting watersheds of Glacier Bay National Park was approved. This three year project is focused on understanding mercury contaminant loads in three stream locations near the coast of GLBA. This is a USGS funded project that is occurring within the park.

Human dimension

A portion of PMIS project 156723 was implemented this fiscal year. This project titled Climate Change Scenario Planning for National Parks in Alaska occurred for GLBA, SITK, KLGO and WRST this year. The climate change scenario planning process used a facilitated workshop to identify planning objectives and processes in relation to futuristic climatic scenarios. Partners included US Forest Service, University of Alaska Fairbanks, the Fish and Wildlife Service, and local communities in the area.

Two anthropological studies focused on Tlingit perception of cruise impacts and their perceptions of wilderness character occurred. These were studies to help the Park understand the local native perceptions of resources and activities the Park manages.

The Park continued working on displaying a humpback whale skeleton in a joint resources-interpretation project. The whale was struck by a vessel and killed in the park a few years ago. It will be hung from a newly designed structure. Articulation will occur over winter in FY 13 and it is planned that local school children will help. This is going to be one of the largest humpback whales in the world to be displayed. An Orca skeleton is also being articulated.

Planned work within the Park

The work identified here is work GLBA has applied for funding for or has decided to pursue with funds from future fiscal years.

GLBA is currently in the development process with the National Fish and Wildlife Foundation of creating a CESU funding process to fund graduate students to develop graduate research projects within the Park through a proposal process.

Biological

The SEAN network is currently planning on continued Kittletz's Murrelet and oceanography studies in Glacier Bay.

Glacier Bay NPP is requesting technical assistance on a project titled: Develop monitoring strategies for shore nesting birds in Glacier Bay. This project is aimed at developing a monitoring protocol/strategy for gulls nesting on islands within park boundaries. The park is concerned that they will be forced to develop a plan because of subsistence harvest concerns. This project has not yet been approved.

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR). This project is not yet approved.

There is a halibut movement study planned for next year. Current year implementation could not happen because of an issue with the tags. However, once implemented the project will yield information on halibut movement within the GLBA. This work is being conducted by the University of Alaska, Fairbanks.

Physical

A large scale soil mapping project for all of GLBA, including the coastal areas is beginning in FY13. This project is currently going through the agreement process.

There is an ongoing sound project in Bartlett Cove utilizing a hydrophone to collect underwater acoustics information. The purpose is to collect ongoing ambient sound information, particularly in reference to marine mammal vocalizations and anthropogenic noise. The plan is to potentially expand this program to up to 10 locations throughout inner GLBA.

The Alaska Regional Inventory and Monitoring program is in the process of developing a contract/agreement to acquire digital elevation map data for the entire GLBA. Funding is available now, and once the monetary instrument and recipient are identified, work will proceed to acquire the data. This work is anticipated to continue through FY13.

High quality satellite imagery for the entire GLBA park is going to be acquired in FY12 by the regional inventory and monitoring program. This imagery is going to be used to update the current ortho-imagery that is being used by the park. This work is anticipated to extend into FY13.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

A pCO₂ monitoring program for GLBA was conducted by the University of Alaska Fairbanks to understand the spatial variability of dissolved CO₂ throughout the marine interior of the park. The work is a 3 year study being conducted by Jeremy Mathis and Stacy Reisdorf.

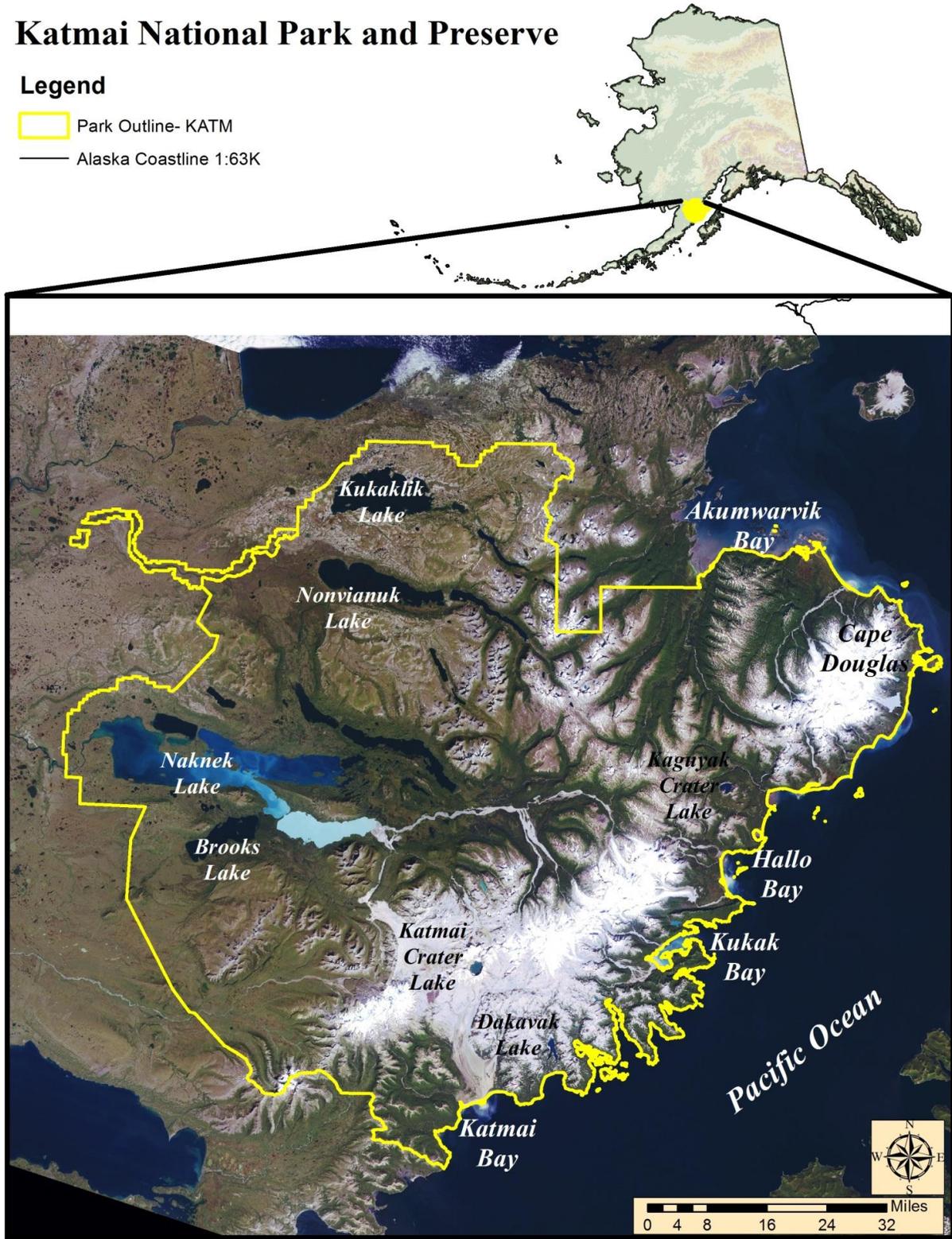
Human dimension

The Park continued working on displaying a humpback whale skeleton in a joint resources-interpretation project. The whale was struck by a vessel and killed in the park a few years ago. It will be hung from a newly designed structure. Articulation will occur over winter in FY 13 and it is planned that local school children will help. This is going to be one of the largest humpback whales in the world to be displayed. An Orca skeleton is also being articulated.

Katmai National Park and Preserve

Legend

-  Park Outline- KATM
-  Alaska Coastline 1:63K



Katmai National Park and Preserve

KATM is a 4,093,076 acre park unit located 250 miles southwest of Anchorage and is accessible by plane and boat. It contains approximately 458 shoreline miles and has significant coastal visitation in the Hallo Bay, Amalik Bay, and Swikshak Bay areas within the Park. The monument was established by presidential proclamation and expanded by ANILCA.

Enabling Legislation

Enabling legislation through presidential proclamation 1487 states the Katmai National Monument (now Park) was established so that “This wonderland may become of popular scenic, as well as scientific, interest for generations to come, inasmuch as all its phenomena exist upon a scale of great magnitude, arousing emotions of wonder at the inspiring spectacles, thus affording inspiration to patriotism and to the study of nature.” Presidential Proclamation 1950 expanded the monument and the enabling legislation so that “the public interest would be promoted by adding to the Katmai National Monument, Alaska, certain adjoining lands for the purpose of including within said monument additional lands on which there are located features of historical and scientific interest and for the protection of the brown bear, moose, and other wild animals”. Further addition of land through presidential proclamation 2564 expanded the monument because “certain public land islands situated near the Katmai National Monument in Alaska are required for the proper care, management, and protection of the objects of scientific interest located on lands within said monument”. Recognizing the value of Naknek lake to the ecosystems of Katmai Monument Presidential Proclamation 3890 further expanded the monument and purposes with “the inclusion of all such lake and shores is necessary for the protection of the ecological and other scientific values of this” [Naknek] “lake and the existing monument”.

Finally renamed a national park Katmai was expanded with the addition of a preserve through ANILCA with the specific purpose “to protect habitats for, and populations of, fish and wildlife including, but not limited to, high concentrations of brown/grizzly bears and their denning areas; to maintain unimpaired the water habitat for significant salmon populations; and to protect scenic, geological, cultural and recreational features”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park; red (*Onocorhynchus nerka*) and pink (*Onocorhynchus gorbuscha*) salmon.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in KATM as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

Ship groundings and their subsequent resource damage are of significant concern in this park. Several of the bays throughout KATM are used as a safe harbor from storms by passing vessels. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges. As of yet there has been no significant resource damage to park resources.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources.

Cook Inlet is now being actively developed through oil leases. This park stands to be substantially impacted should an oil spill occur within Cook Inlet. In addition, more shipping traffic is occurring, and the potential for damaged vessels to leak oil is significant. Because of the topography of the marine-coast interface (i.e. the beaches) and the height of the tide, there is a significant portion of coastline that stands to be severely impaired with petroleum resource damage.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in KATM, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

KATM installed cameras in Swikshak Bay for monitoring bear foraging areas throughout the area. This project is aimed at determining resource uses, locations, and frequencies to understand bear utilization of the system.

Coastal seabird coastwalks were conducted by KATM staff. This project focuses on identifying and quantifying the numbers of dead birds along transects of coastline within the park specifically for the purpose of being able to understand the natural variability of dead bird occurrences should an environmental incident take place. This will help with natural resource damage assessments if necessary.

The SWAN program continued with their near shore monitoring program. This work includes surveys of eelgrass along the KATM coast; sheltered rocky intertidal invertebrates and algae; limpet size and distributions; mussel size and density; summer and winter marine bird surveys; Black Oystercatcher nest density and diet; sea otter abundance through aerial surveys; and sea otter diet and survival surveys.

Physical

Backcountry impacts work is an ongoing project being conducted jointly by the coastal ecologist and the backcountry rangers. This project focuses on identifying locations of backcountry impacts when identified, understanding the types of impacts that are occurring, and the severity of the impacts at each site.

The SWAN program continued monitoring of temperature and salinity at 5 locations within KATM ocean system. These sensors placed in the marine environment along the KATM coast yield significant information about the long term temperature and salinity structure in the near shore marine environment.

The SWAN program acquired aerial photography of the entire KATM coastline. This data was collected to understand landscape processes, land cover change, land boundaries, and biological change.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in KATM has been identified at this time.

Human dimension

KATM conducted bear viewing surveys along the coast in Hallo Bay and Kukak bay during the summer. The main focus of this project is to determine densities and proximities of humans and bears.

Planned work within the Park

The work identified here is work KATM has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

The SWAN program intends to conduct a full scale lichen inventory project within KATM in 2013. This inventory will include lichens along all coastal systems within the park.

The SWAN program acquired aerial photography of the entire KATM coastline. Plans to analyze the data for land cover and biological change begin in FY 13.

The SWAN program intends to continue with their near shore monitoring program. This work includes surveys of eelgrass along the KATM coast; sheltered rocky intertidal invertebrates and

algae; monitor gravel/mixed sand intertidal invertebrates; limpet size and distributions; mussel size and density; summer marine birds surveys; Black Oystercatcher nest density and diet; and sea otter diet and survival surveys.

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR). This project is not yet approved.

PMIS 186857 has received regional funding. The project is titled: Evaluation of coastal brown bear populations and harvest monitoring methodologies. This project takes place primarily in Katmai and Lake Clark and aims at determining coastal bear movements and if there is any connectivity between summer coastal foraging areas, human-bear interactions from high density bear viewing areas and the potential for habituation, and subsequent bear harvest in NPS preserves and off park land. Planned implementation is FY 14.

Physical

The SWAN program is planning to continue monitoring of temperature and salinity at 5 locations within the KATM ocean system. These sensors placed in the marine environment along the KATM coast yield significant information about the long term temperature and salinity structure in the near shore marine environment.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

No future chemical ocean or coastal resources work in KATM has been identified at this time.

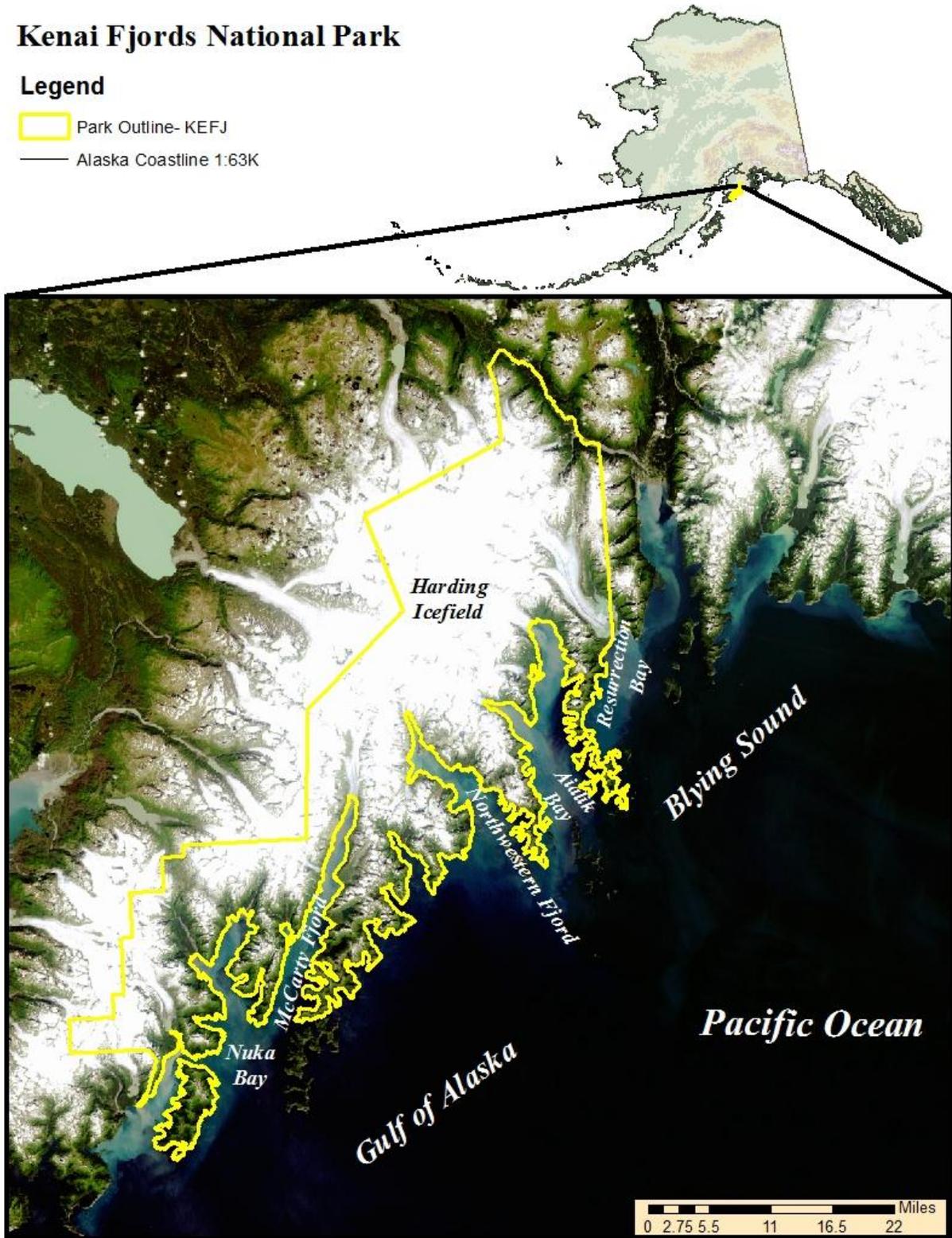
Human dimension

No future human dimension ocean or coastal resources work in KATM has been identified at this time.

Kenai Fjords National Park

Legend

-  Park Outline- KEFJ
-  Alaska Coastline 1:63K



Kenai Fjords National Park

KEFJ is a 669,000+ acre park unit located 80 miles south of Anchorage and 3 miles east of Seward, on the south central Alaska coast and is accessible by road, plane, and boat. It contains approximately 545 shoreline miles that include wetlands, fjords, and lagoons. The park was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “To maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers, and coastal fjords and islands in their natural state; and to protect seals, sea lions, other marine mammals, and marine and other birds and to maintain their hauling and breeding areas in their natural state, free of human activity which is disruptive to their natural processes. In a manner consistent with the foregoing, the Secretary is authorized to develop access to the Harding Icefield and to allow use of mechanized equipment on the icefield for recreation”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to park resources.

Environmental

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Retreat of tidewater glaciers and subsequent changes in freshwater inputs are a big concern for the park. These changes may affect visitation, habitat availability, and water quality. Saltwater intrusion to KEFJ streams and tidally influenced lakes and lagoons, and their ecological impacts to KEFJ coastal systems is a significant concern associated with glacial retreat.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park; red (*Onocorhynchus nerka*), silver (*Onocorhynchus kisutch*), and pink (*Onocorhynchus gorbuscha*) salmon.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive.

The aquatic invasive Elodea is beginning to spread throughout the region. While this has not been identified in KEFJ as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

Ship groundings and their subsequent resource damage are of significant concern in this park. Vessel groundings may occur, along with subsequent cargo or oil discharges. The park continues to have ongoing concerns about the lingering ecological and biological impacts of the Exxon Valdez oil spill.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources.

Other potential threats are visitor use (through vessel, kayak, or aircraft) and subsequent disturbance or mortality to wildlife; cultural resource impacts on landing beaches; fishing or harvesting pressure; and increases in vegetation trampling and invasive plants.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the park relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in KEFJ, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The SWAN program continued with their near shore monitoring program. This work includes surveys of eelgrass along the KEFJ coast; sheltered rocky intertidal invertebrates and algae; limpet size and distributions; mussel size and density; summer and winter marine bird and mammal surveys; black oystercatcher Black Oystercatcher nest density and diet; and sea otter diet and survival surveys.

The SWAN program carried out reconnaissance surveys for long term monitoring sites in old growth forest in coastal KEFJ. This reconnaissance project work will include a focus on forest inventory and analysis sites (FIA) used and those sites with the ability to expand the FIA network.

SWAN and KEFJ conducted joint bald eagle occupancy and productivity monitoring, occurring since 2009 and 2010 respectively.

The SWAN program targeted an opportunistic sampling plan for non-vascular plants (primarily lichens and mosses) for a non-vascular plant inventory in coastal old growth forest in KEFJ that the SWAN intends to collect at a future time when funding is available.

PMIS project 139093 titled “Understanding Spatio-Temporal Variability within Colonial Nesting Seabird Populations” is approved and funded. The purpose of this study is to continue collaborative efforts between KEFJ and the Alaska Maritime National Wildlife Refuge to obtain population information on breeding seabirds by obtaining population estimates and status

assessments for colonial nesting seabirds. This information will be used to develop protocols for monitoring colonial nesting seabirds.

USGS with the SWAN I&M program began conducting a food web study in KEFJ using isotopic analyses to determine the contributions of micro versus macro algal components in the near shore coastal system.

Marine invasives (green crab and tunicate) monitoring in Aialik Bay started in response to vessel traffic and marine debris issues.

KEFJ participated in COASST (Coastal Observation and Seabird Survey Team) program, coordinated by the University of Washington, monitoring seabird mortality as an indicator of natural and human-induced events and changes.

KEFJ continued to implement coastal campsite monitoring program to measure biological impacts to coastal campsites by visitors.

Physical

The SWAN program continued monitoring of temperature and salinity at locations within KEFJ. These sensors placed in the marine environment along the KEFJ coast yield significant information about the long term temperature and salinity structure in the near shore marine environment.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

KEFJ continued a glacier mass balance long term monitoring study. Understanding the mass balance of glaciers has implications for coastal processes in this park. Changes in glacier mass balance indicate changes to freshwater flow into the marine system, with potential consequences in water chemistry, habitat stability, and biological compatibility.

KEFJ continued a repeat photo project for tidewater glaciers. This project collects photographic documentation of the ongoing changes to the tidewater glacier extent and immediate surrounding environment. This work allows the park to document changes to the fjord systems and associate time scales, and correlatory environmental factors to those changes.

KEFJ continues to support the Resurrection Bay Conservation Alliance in marine debris clean up efforts. This is an ongoing project with selected beaches identified and cleaned on a rotating basis. KEFJ provides vessel and personnel support for this operation.

Chemical

The SWAN program targeted an opportunistic sampling plan for mosses in old growth forest for a contaminants study in the coastal forests of KEFJ. This is preliminary work for a contaminants inventory that the SWAN intends to collect at a future time when funding is available.

Human dimension

No human dimension ocean or coastal resources work in KEFJ has been identified at this time.

Planned work within the Park

The work identified here is work KEFJ has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

The SWAN program intends to continue with their near shore monitoring program. This work includes surveys of eelgrass along the KEFJ coast; sheltered rocky intertidal invertebrates and algae; gravel/mixed sand intertidal invertebrates, limpet size and distributions; mussel size and density; summer and winter marine birds surveys; Black Oystercatcher nest density and diet; sea otter abundance through aerial surveys; and sea otter diet and survival surveys.

The SWAN program has an existing agreement for photo-interpretation to be used for vegetation and land change analysis. This work will be conducted for KEFJ in FY13.

PMIS project 169251 titled “Investigate Seabirds as Prey and Sources of Environmental Contaminants in Raptor Populations” has been funded through the USGS-NRPP funding and will begin in FY13. The main goals of this project are to determine the relative importance of seabird species in bald eagle and peregrine falcon diets; raptor diet variations relative to seabird colony proximity; raptor contaminant variations with diet; correlations of raptor reproductive success and diet composition and contaminants; and compare KEFJ raptor and seabird contaminant levels with those of other populations in Alaska.

PMIS project 139093 titled “Understanding Spatio-Temporal Variability within Colonial Nesting Seabird Populations” is approved and funded, and will continue in FY13. The purpose of this study is to continue collaborative efforts between KEFJ and the Alaska Maritime National Wildlife Refuge to obtain population information on breeding seabirds by obtaining population estimates and status assessments for colonial nesting seabirds. This information will be used to develop protocols for monitoring colonial nesting seabird.

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR).

PMIS 169262 has received regional funding. The project is titled: Examine Factors Affecting Productivity of Black Oystercatchers in Southwest Alaska. This project takes place primarily in Kenai Fjords and targets adding additional information to the SWAN I&M monitoring that is already taking place. Because these are a species of concern for the park, more information is necessary to determine their productivity and survivorship. Planned implementation is FY 13.

PMIS 186029 “Protect wild coho salmon in the Resurrection River Watershed” is approved for FY14 funding through Alaska Regional Block Grant. This project will identify the migration

routes, run timing, spawning distribution, and spawn timing of coho salmon in the Resurrection River.

KEFJ was approved for FY14 funding through the USGS-NRPP program for a sea otter project titled: Foraging ecology of sea otters in Kenai Fjords National Park. This project is focused on understanding otter prey selection and seasonality in KEFJ to understand food base resource and resource abundance vulnerability.

Physical

The SWAN program is planning to continue monitoring of temperature and salinity within KEFJ. These yield significant information about the long term temperature and salinity structure in the near shore marine environment.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

PMIS 141965 has received regional funding to proceed. This project is titled: Reconnaissance and Mapping of Sea Caves along the Coast of Kenai Fjords National Park. The goal of this project is to identify the locations of caves along the coast and document their locations, geology, and any natural or cultural resources associated with them. Planned implementation is FY 16.

KEFJ continues to support the Resurrection Bay Conservation Alliance in marine debris clean up efforts. This is an ongoing project with selected beaches identified and cleaned on a rotating basis. KEFJ provides vessel and personnel support for this operation.

Chemical

No future chemical ocean or coastal resources work in KEFJ has been identified at this time.

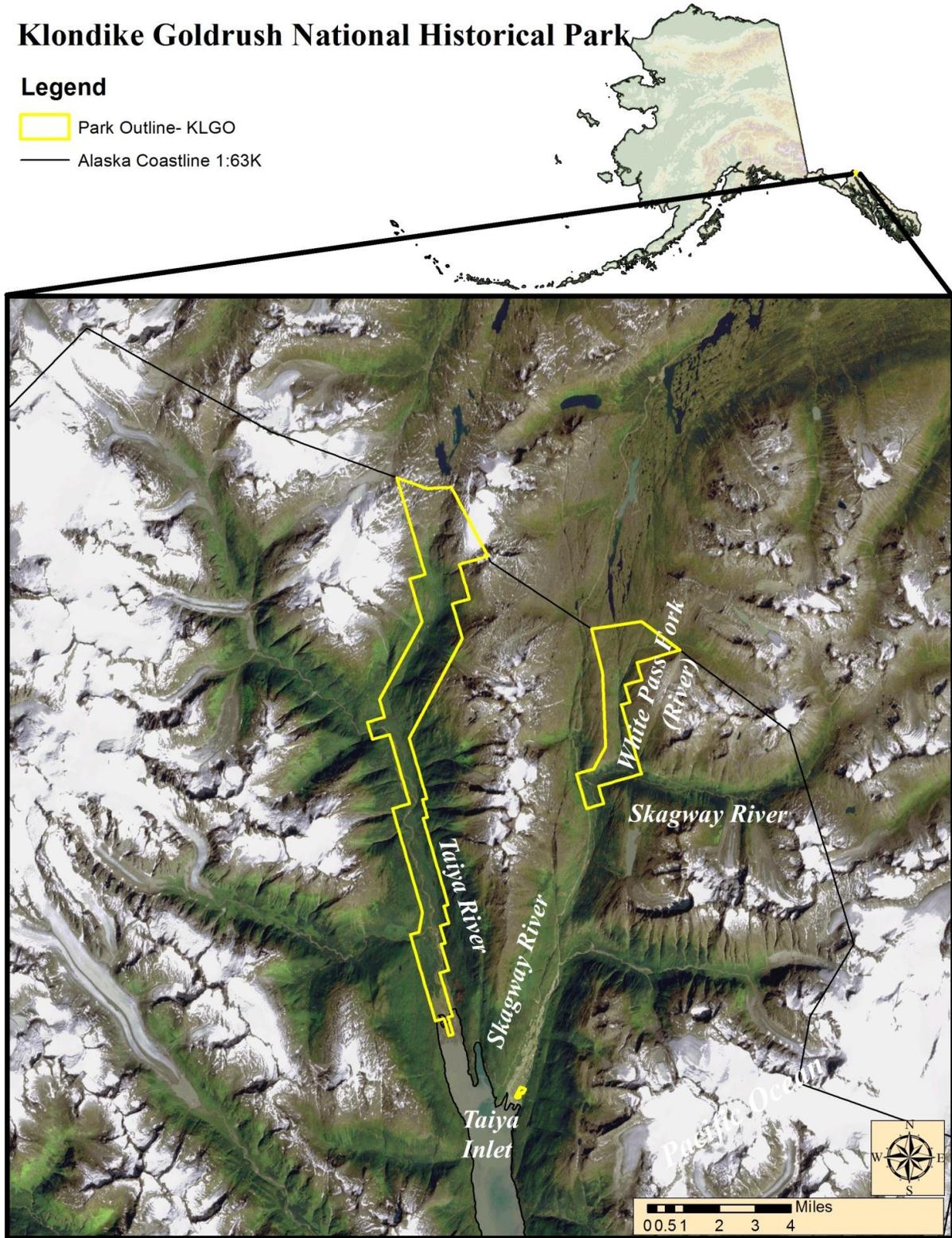
Human dimension

No future human dimension ocean or coastal resources work in KEFJ has been identified at this time.

Klondike Goldrush National Historical Park

Legend

-  Park Outline- KLGO
-  Alaska Coastline 1:63K



Klondike Goldrush National Historical Park

KLGO is a 12,000+ acre park unit located 507 miles east of Anchorage and 90 miles north of Juneau, on the south east Alaska coast and is accessible by road from Skagway. It contains approximately 0.5 shoreline miles that include Taiya River outlet and tidal flat. The park was established by Public Law 94 – 323, 90 Stat 717 in 1976.

Enabling Legislation

Enabling legislation states the historical park was created “in order to preserve in public ownership for the benefit and inspiration of the people of the United States, historic structures and trails associated with the Klondike Gold Rush of 1898”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to Park resources.

Environmental

The docks located in Dyea are part of the historical setting for the park and are slowly being weathered and eroded. There is ongoing disagreement as to the parties responsible for preservation and maintenance because of inholdings within the Park. These docks constitute a significant historical asset to interpreting the Goldrush era for which the park was established.

There is an extremely steep coastal margin within the nearby inlet. Steep slopes combined with relatively unstable marine sediments create the likelihood of locally generated tsunamis.

The Taiya river is a glacially fed river with significant groundwater inputs. Changes in the rates of glacial melt, stream temperatures, and sediment load can potentially cause significant impact to the natural resources within the park, as well as to the resources immediately offshore. Of great concern are eulachon (*Thaleichthys pacificus*) and salmon runs native to the river; coho (*Oncorhynchus kisutch*) and pink salmon (*Oncorhynchus gorbuscha*). The salmon in the region provide a source of both commercial and recreational economy to the Skagway area, while both the salmon and the eulachon are functionally significant to the ecology of the system.

The potential for glacial outburst flooding is high from both West Creek and Norse glaciers. This type of flooding has a historical record and is known to have occurred relatively recently in West Creek. Norse glacier contains a series of impounded waters, with the uppermost in the series having the greatest potential for initial outburst, which would likely lead to failure of the subsequent impoundments. Flooding of this type would have significant impacts on the Taiya river system.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Invasive species of tunicate (*Didemnum vexillum*) and European green crab (*Carcinus maenas*) are known to be moving up the west coast of North America. Invasive tunicates have moved as far north as Sitka and green crabs are almost to the SE Alaska border.

The aquatic invasive Elodea is beginning to spread throughout the region. While this has not been identified in KLG0 as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Significant reduction in amphibian populations resulting from unknown causes is an ongoing concern of the Park. Historical references to high populations are not duplicated in today's environment.

Anthropogenic

Nutrication of the inlet is a significant concern. The town of Skagway wastewater treatment plant in the past has routinely failed to meet discharge requirements under their Pollutant Discharge Elimination Systems permit. Additionally, the cruise ship industry is pushing to change legislation to allow discharge of wastewater into Alaska State waters in Skagway.

Heavy metals within the Taiya inlet are a cause for concern. Due to the history of being a mining town, there is significant heavy metal pollution from industrial sources that have made water quality in Skagway and lower Pullen creek fail Alaska state water quality standards (Alaska 2010).

Development is a significant concern in this area. Currently plans are underway to build an additional cruise ship dock in Skagway to accommodate the increase in demand in this region. Additionally, the ongoing challenge of construction of a road from Juneau to Skagway is a concern that, if completed, would bring an additional influx of people to the area, further straining limited resources.

The transport of mining ore through Skagway from Canada is an ongoing cause of concern. Understanding contaminants and current contaminant levels in relation to proposed ore traffic through park areas is important.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the park and relating to ocean and coastal Systems. This is not intended to be a comprehensive listing of all work being accomplished in KLG0, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The park continued conducting coastal bird surveys (implemented since 2004). These surveys include shorebirds, seabirds, and waterbirds all found within the Taiya inlet. Surveys are conducted once per week in the spring and fall, and twice per month at other times of the year.

The park has been conducting frog surveys within known population areas of the Park. Surveys are conducted to determine population changes, and survival rates. This is ongoing work within the park.

Ground truthing surveys for the vegetation maps for KLG0 took place this summer. This is the final stage in completing the vegetation maps for this park.

Physical

The Park continued support for the Taiya River USGS gaging station (15056210). This gaging station ran from late 1969 to late 1977, and then stopped until the KLGO found funding to restart the gauging effort in late 2003. Discharge data is available at <http://waterdata.usgs.gov/nwis/>.

KLGO conducted a repeat photography project examining glacial retreat within the park. Associated with the repeat photography is the utilization of these images for vegetation colonization and succession studies.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

The park continued to support ongoing work with the mussel watch program. There are two sites the park monitors, one is close to the Skagway harbor, and the other is just off of long bay.

Human dimension

A portion of PMIS project 156723 was implemented this fiscal year. This project titled Climate Change Scenario Planning for National Parks in Alaska occurred for GLBA, SITK, KLGO and WRST this year. The climate change scenario planning process used a facilitated workshop to identify planning objectives and processes in relation to futuristic climatic scenarios. Partners included US Forest Service, University of Alaska Fairbanks, the Fish and Wildlife Service, and local communities in the area.

Planned work within the Park

The work identified here is work KLGO has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

The park has been conducting frog surveys within known population areas of the Park. Surveys are conducted to determine population changes, and survival rates. This is ongoing work within the park.

PMIS project 168715 was approved with implementation planned in FY15. The project is titled Determine distribution & productivity for a declining culturally important anadromous fish, eulachon. This project will determine the location and productivity of spawning areas, and collect reference data on the timing of eulachon runs in the park.

Physical

The Taiya River gauging station funding is planned to continue for USGS to monitor the water levels on the Taiya.

A large scale soil mapping project for all of KLGO, including the coastal areas is beginning in FY13. This project is currently going through the agreement process.

Klondike Goldrush NHP is requesting technical assistance in determining a strategy to address a proposed hydropower plant on lands adjacent to the park. The project is titled: Help develop an NPS strategy and comments in response to the West Creek hydropower feasibility study. The park is concerned about potential impacts of the plant and transmission lines to Park natural and cultural resources. This request has not yet been approved.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

There are no known planned chemical resource operations related to ocean and coastal resources at this time. Mussel watch work is planned to continue.

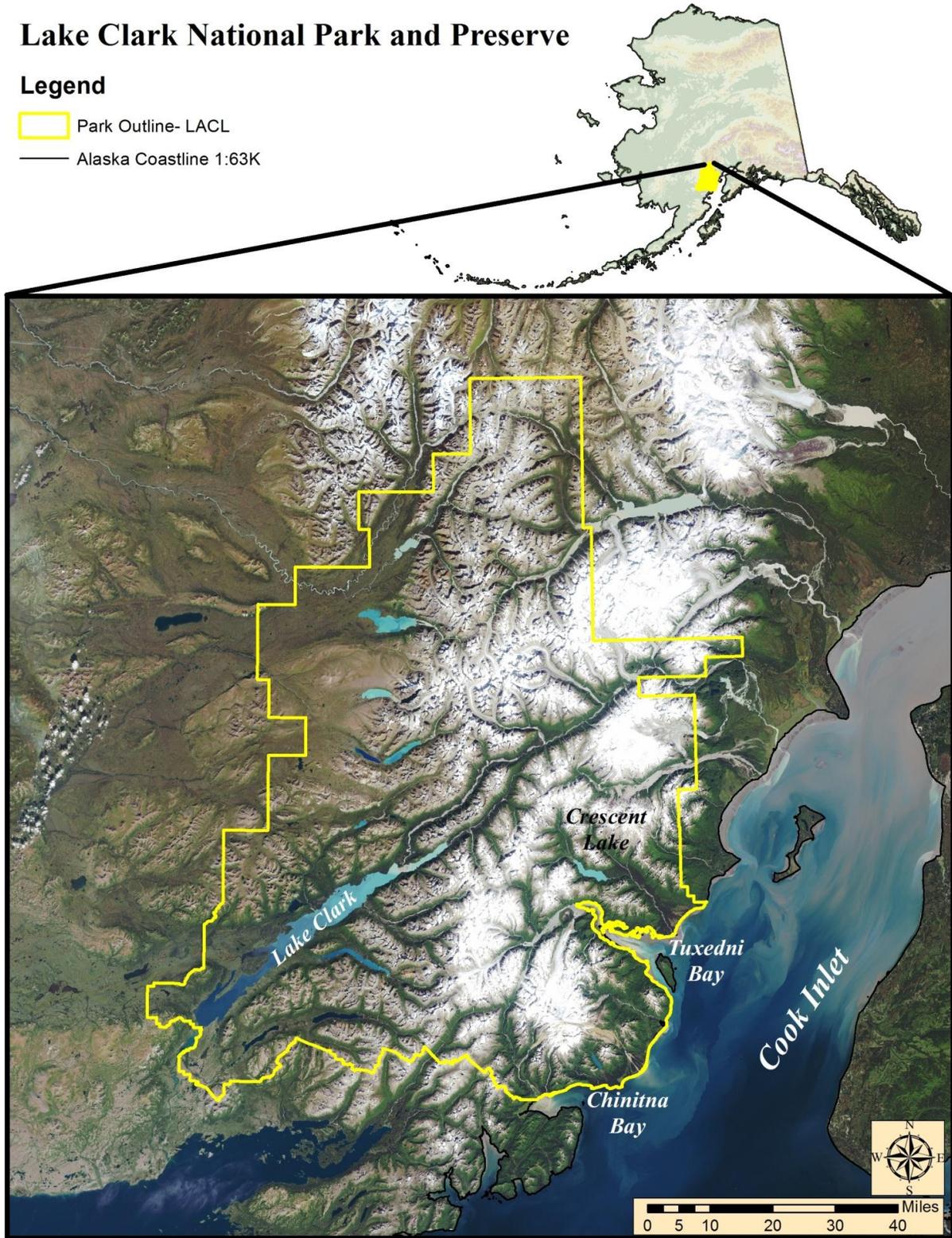
Human dimension

No future human dimension ocean or coastal resources work in KLGO has been identified at this time.

Lake Clark National Park and Preserve

Legend

-  Park Outline- LACL
-  Alaska Coastline 1:63K



Lake Clark National Park and Preserve

LACL is a 1,214,000+ acre park unit located across the Cook Inlet, 100 miles southwest of Anchorage and 50 miles northwest of Homer, in south central Alaska, and is accessible by plane and boat. It contains approximately 220 shoreline miles that include wetlands, fjords, and lagoons. The park was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “To protect the watershed necessary for perpetuation of the red salmon fishery in Bristol Bay; to maintain unimpaired the scenic beauty and quality of portions of the Alaska Range and the Aleutian Range, including active volcanoes, glaciers, wild rivers, lakes, waterfalls, and alpine meadows in their natural state; and to protect habitat for and populations of fish and wildlife including but not limited to caribou, Dall sheep, brown/grizzly bears, bald eagles, and peregrine falcons”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park; red (*Onocorhynchus nerka*), silver (*Onocorhynchus kisutch*), and pink (*Onocorhynchus gorbuscha*) salmon.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in LACL as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

Ship groundings and their subsequent resource damage are of significant concern in this park. Should storms be severe enough, vessel grounding may occur, along with subsequent cargo or oil discharges.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources. Coastal resources include fossils which could be damaged or destroyed by marine debris.

Cook Inlet is now being actively developed through oil leases. This park stands to be substantially impacted should an oil spill occur within Cook Inlet. In addition, more shipping traffic is occurring, and the potential for damaged vessels to leak oil is significant. Because of the topography of the marine-coast interface (i.e. the beaches) and the height of the tide, there is a significant portion of coastline that stands to be severely impaired with petroleum resource damage.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in LACL, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

LACL is conducted bear trend counts along the coast in June and July. This is an annual survey to understand changes in bear counts along the coast.

PMIS project 156670 titled “Ecology of wolves in coastal Lake Clark National Park” was funded and began in FY12 and will continue through FY14. This project is designed to assess the distribution, territorial mosaic, dispersal, prey composition, and population dynamics of wolves within coastal LACL with the purpose of understanding the LACL wolf ecological niche and understand the impacts of the adjacent predator control program.

PMIS project 156546 titled “Assessing use of marine derived salmon in wolf diets across Alaskan parks” was funded in FY11 and continued in FY12. This project focuses on collecting samples of wolf hair from various locations across Alaska (National Parks, National Wildlife Refuges, and State lands) and analyzing the samples using stable isotopes to determine how widespread the use of salmon is in wolf diets. The final results and report will be available in FY13.

Physical

The SWAN program acquired aerial photography of the entire LACL coastline. This data is being collected to understand landscape processes, land cover change, land boundaries, and biological change.

An agreement with the University of Alaska’s Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

The Regional office, LACL, and NOAA are worked together to attempt installation of two a temporary tidal gaging station on the LACL coast. This would have allowed the park to be able

to identify and establish mean high tide and thus the park boundaries along the entire coast. This project is now planned for FY13.

A RAWS station continues to be maintained at Hickson Lake along the coast of LACL. There are currently plans to create a safer access to this site as current access is unsafe.

Chemical

No chemical ocean or coastal resources work in LACL has been identified at this time.

Human dimension

No human dimension ocean or coastal resources work in LACL has been identified at this time.

Planned work within the Park

The work identified here is work LACL has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

The SWAN program plans to conduct gravel/mixed sand gravel intertidal invertebrate monitoring as part of their near shore monitoring program in LACL in FY 13.

The SWAN program is currently in the process of acquiring aerial photography of the entire LACL coastline. Once this data is collected, it will be analyzed for land cover and biological change beginning in FY 13.

PMIS project 156670 titled “Ecology of wolves in coastal Lake Clark National Park” was funded and began in FY12 and will continue through FY14. This project is designed to assess the distribution, territorial mosaic, dispersal, prey composition, and population dynamics of wolves within coastal LACL with the purpose of understanding the LACL wolf ecological niche and understand the impacts of the adjacent predator control program.

PMIS 186857 has received regional funding. The project is titled: Evaluation of coastal brown bear populations and harvest monitoring methodologies. This project takes place primarily in Katmai and Lake Clark and aims at determining coastal bear movements and if there is any connectivity between summer coastal foraging areas, human-bear interactions from high density bear viewing areas and the potential for habituation, and subsequent bear harvest in NPS preserves and off park land. Planned implementation is FY 14.

Physical

LACL is currently listed as a park in the work plan for PMIS project 168715 which has been regionally approved and is competing for national ONPS funding. The project is titled Assessing and Mapping Marine Debris in Southwest Alaska Coastal Parks. This project is aimed at identifying marine debris buildup on coastal beaches, assess their impacts, target clean-up areas, and provide information to NOAA to further develop marine debris transport models. Major concerns are with damage to cultural and natural resources. If approved, funding would begin in FY 13.

The Regional office, LACL, and NOAA are worked together to attempt installation of two a temporary tidal gaging station on the LACL coast. This would have allowed the park to be able to identify and establish mean high tide and thus the park boundaries along the entire coast. This project is now planned for FY13.

A large scale soil mapping project for all of LACL, including the coastal areas is beginning in FY13. This project is currently going through the agreement process.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

A RAWS station will continue to be maintained at Hickson Lake along the coast of LACL. This weather station may be recommended to be changed to another location if plans to create a safer access are not successful. However, this station will be maintained until a decision is made about the station.

A Paleontological survey of 2 sites along the Lake Clark coast has been funded to begin in FY 14. This project is targeting the Tuxedni formation, and giving a formal geological description of the area around fossil point

Chemical

No future chemical ocean or coastal resources work in LACL has been identified at this time.

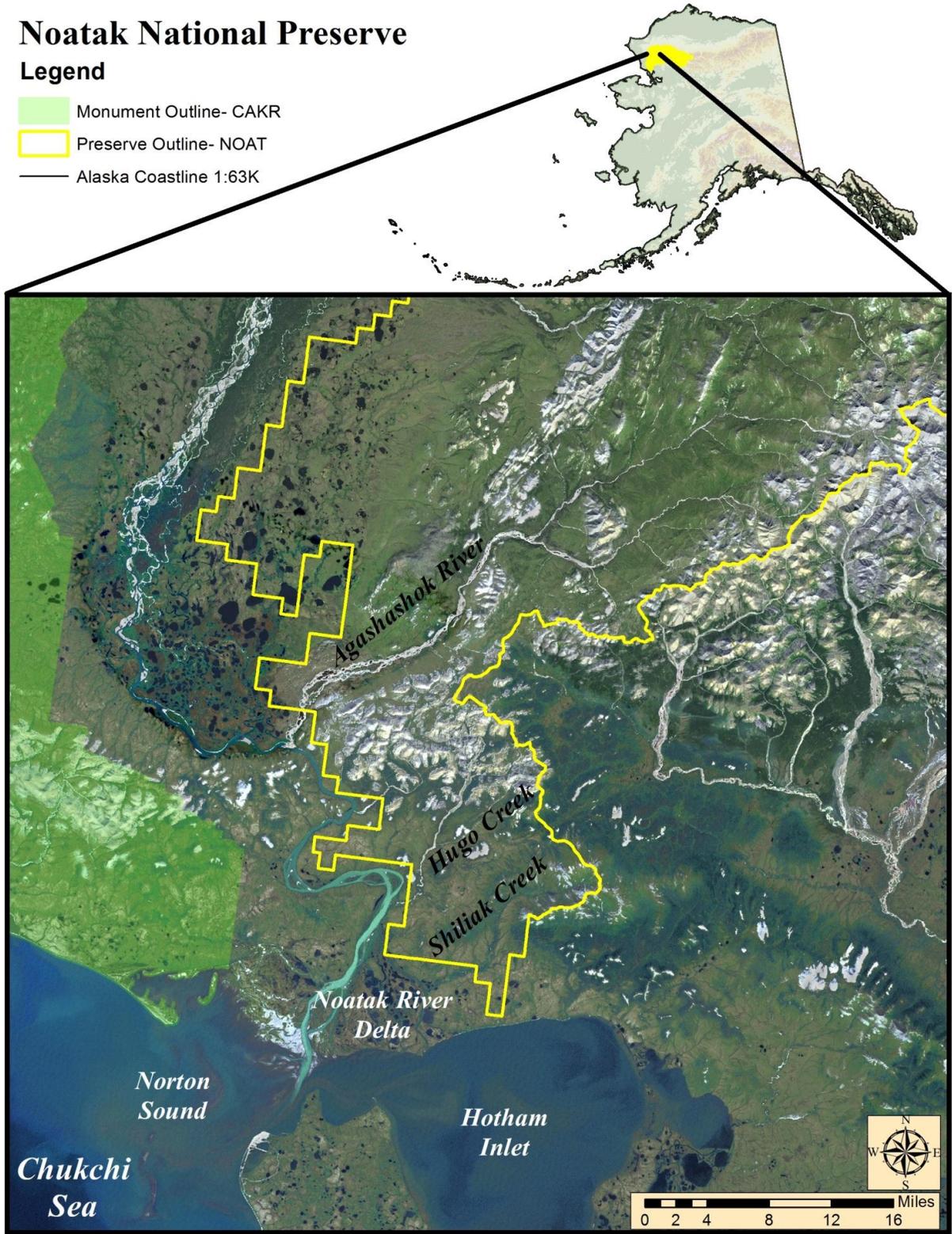
Human dimension

No future human dimension ocean or coastal resources work in LACL has been identified at this time.

Noatak National Preserve

Legend

- Monument Outline- CAKR
- Preserve Outline- NOAT
- Alaska Coastline 1:63K



Noatak National Preserve

NOAT is a 6,460,000+ acre park unit located 560 miles northwest of Anchorage and 15 miles northeast of Kotzebue, in northwestern Alaska, and is accessible by plane and boat. The boundary ends just short of the coastline; however, NOAT contains approximately 3,000 acres of coastal wetlands south of Shiliak Creek, near the Noatak River Delta and the Hotham inlet. The park was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “To maintain the environmental integrity of the Noatak River and adjacent uplands within the preserve in such a manner as to assure the continuation of geological and biological processes unimpaired by adverse human activity; to protect habitat for, and populations of, fish and wildlife, including but not limited to caribou, grizzly bears, Dall sheep, moose, wolves, and for waterfowl, raptors, and other species of birds; to protect archeological resources; and in a manner consistent with the foregoing, to provide opportunities for scientific research”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact preserve coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Environmental

Temperature increases in the surface water is a primary source of concern related to the systems in this park. Temperature increase in the coastal lakes and streams may have detrimental effects on the aquatic and avian fauna of the streams and wetlands

Permafrost melt is another concern, with associated coastal tundra inundation and slumping increasing sediment loads into the nearby streams.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in NOAT as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

Anthropogenic

Most anthropogenic effects in this park are limited to boat traffic along the Noatak river and include debris and groundings. Subsistence hunting is allowed, but hunting conflicts can occur.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in NOAT, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

Musk ox surveys were conducted within NOAT this year. This project aims to identify and quantify the musk ox populations in NOAT. This work includes both coastal and inland musk-ox locations based on radio collar transmitters affixed to the animals.

Physical

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in NOAT has been identified at this time.

Human dimension

No human dimension ocean or coastal resources work in NOAT has been identified at this time.

Planned work within the Park

The work identified here is work NOAT has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

Current information on future coastal biological resource efforts is not available at this time.

Physical

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

No future chemical ocean or coastal resources work in NOAT has been identified at this time.

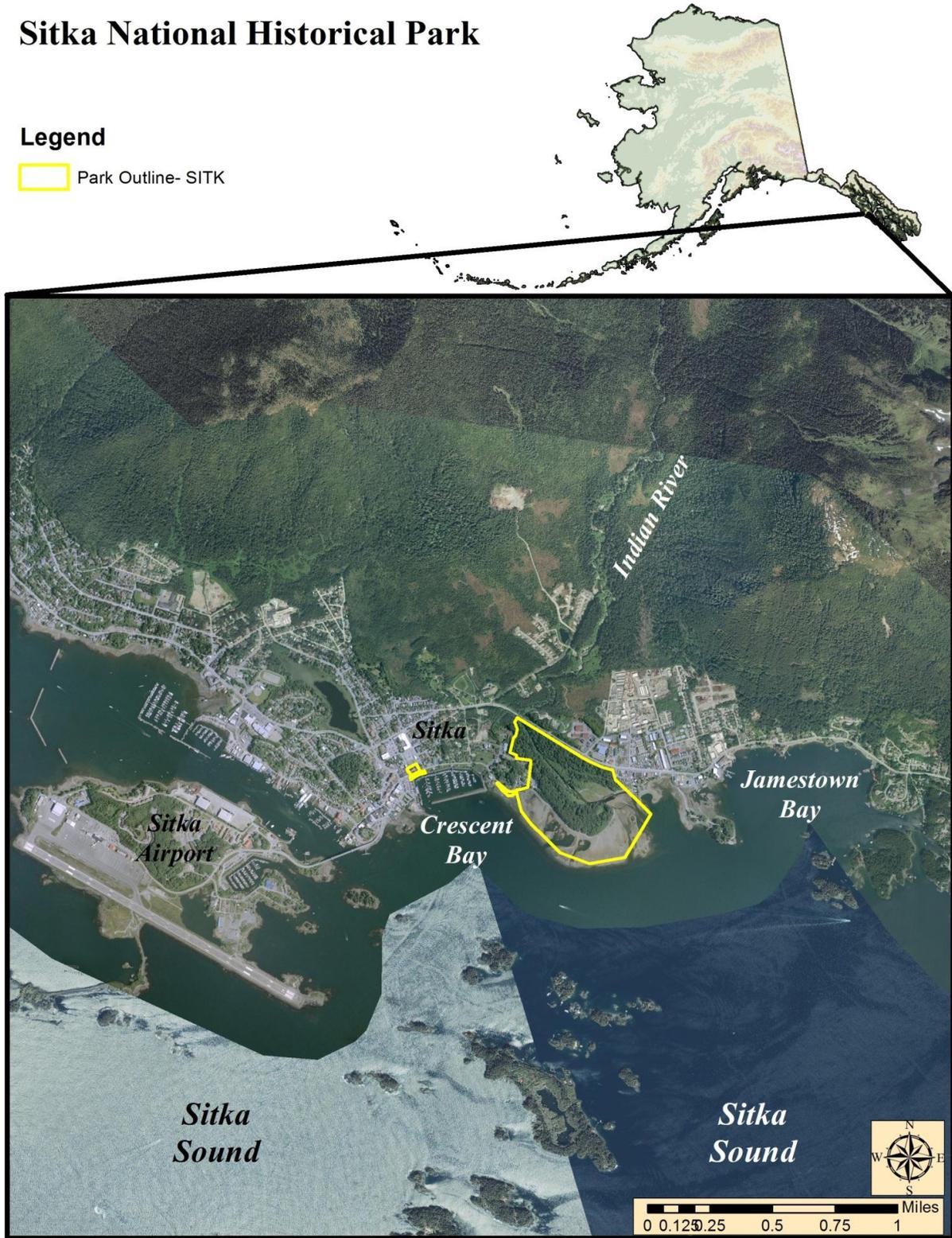
Human dimension

No future human dimension ocean or coastal resources work in NOAT has been identified at this time.

Sitka National Historical Park

Legend

 Park Outline- SITK



Sitka National Historical Park

SITK is a 113 acre park unit located 587 miles southeast of Anchorage in the town of Sitka, in southeastern Alaska, and is accessible by car. It contains approximately 1.2 shoreline miles.

Enabling Legislation

The historical park was initially created in 1890 by an unnumbered Presidential Proclamation to create a public park for “public uses”. In 1910 the purpose was expanded by Presidential Proclamation 959 to preserve “the decisive battle ground of the Russian conquest of Alaska in 1804, and also the site of the former village of the Kik-Siti tribe, the most warlike of the Alaskan Indians; and that here also are the graves of a Russian midshipman and six sailors, killed in the conflict, and numerous totem poles constructed by the Indians, which record the genealogical history of their several clans”. The purposes of the Park were expanded by Public Law 92 - 501 “to preserve in public ownership for the benefit and inspiration of present and future generations of Americans an area which illustrates a part of the early history of the United States by commemorating czarist Russia's exploration and colonization of Alaska” and to be managed in accordance with the Organic Act.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Natural

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park, primarily pink (*Onocorhynchus gorbuscha*) salmon.

Erosion of the stream banks is cause for concern in the park. Potentially hazardous items can be exposed during erosional events. Additionally, erosion is happening at the boundary of the park, next to a small residential area.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with approximately 25% known to be potentially invasive. Invasive tunicates are already found in Sitka Sound and farther north while European green crabs have not quite made it into Alaska.

Anthropogenic

This park lies adjacent to a fish hatchery which utilizes the Indian river that flows through the park as its water source. The hatchery currently holds a water right for 30 cfs in the river, though ongoing debate may indicate that it actually only has a water right for 16 cfs necessary to run the hatchery. This may be an issue for sustaining the Park's aquatic resources in times of drought which have been known to reach flows around 16 cfs in the past.

The hatchery is also the source of a large pink salmon run in the Indian River. Currently unknown are the impacts to the native run of pink salmon in the river. Ongoing research to determine run numbers for hatchery and native salmon is ongoing.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources.

Coastal use is another concern for the park. This is a park with relatively high visitation throughout the park and cruise ships anchoring just offshore of the park. This leads to heavy foot traffic, litter, and other associated human issues including the development of social trails and invasive species introduction. Furthermore, relaxing of legislation may allow cruise ship discharge into park waters just offshore of the park.

Airport expansion in Sitka is another park concern. There are currently plans to extend the Sitka Airport runway to the southeast. This creates two potential issues of concern for the park, the first being the change in water flow dynamics and the second being the source location for base material for the runway. The second concern is the highest priority concern for the park. When the runway was first developed and extended into Sitka Sound, source material came from the intertidal zone of the park. The removal of this material changed the dynamics of the intertidal region and the Indian river mouth. There is concern the Army Corps of Engineers will look to the park for more source material.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in SITK, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

The park is an active participant in the tunicate and European green crab monitoring efforts across the state. The park received training on conducted monitoring operation in May, implementing the program at that point.

Sitka NHP received technical assistance for quantifying natural vs. hatchery salmon returns. The project is titled: Assist with the quantification of hatchery-spawned salmon straying into the Indian River. It is primarily focused on developing a good strategy for scientifically addressing the numbers of hatchery spawned salmon that are returning to Indian River.

Ground truthing surveys for the vegetation maps for SITK took place this summer. This mapping is in the final stages of completion for the vegetation maps for this park, and should be completed this FY.

Plant inventory work was conducted by park staff. Previous inventory work was incomplete and misidentified several species that were not present in the park. Much of the plant inventory update was conducted this FY.

Physical

The SEAN network conducted basic water quality monitoring in the park. Water quality monitoring includes May-October hourly measurements of temperature, conductivity, pH, and dissolved oxygen.

A soil mapping project for SITK, began in FY11. And data analysis was conducted in FY12. The final project results are expected in FY13.

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

A stream gauge monitoring water flow was conducted on the Indian River. This is an ongoing project the park plans to continue. This station monitors Indian River flow to enable the Park to understand Indian River flow and resource requirements.

Chemical

No chemical ocean or coastal resources work in LACL has been identified at this time.

Human dimension

A portion of PMIS project 156723 was implemented this fiscal year. This project titled Climate Change Scenario Planning for National Parks in Alaska occurred for GLBA, SITK, KLGO and WRST this year. The climate change scenario planning process used a facilitated workshop to identify planning objectives and processes in relation to futuristic climatic scenarios. Partners included US Forest Service, University of Alaska Fairbanks, the Fish and Wildlife Service, and local communities in the area.

Planned work within the Park

The work identified here is work SITK has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

The park has plans to continue invasive species sampling in the intertidal area of the park. This sampling is primarily for European green crabs and tunicates.

Plant inventory work is planned for FY13. Previous inventory work was incomplete and misidentified several species that were not present in the park. Much of the plant inventory update was conducted in FY12; however, work remains to be done in FY13.

PMIS project 173862 was approved and will receive funding from FY13-FY16. This project is titled Quantification of hatchery-spawned salmon straying into the Indian River. The purpose of

the project is to identify and quantify the percentage of hatchery salmon relative to natural salmon returning to the Indian River watershed.

Physical

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

No future chemical ocean or coastal resources work in LACL has been identified at this time.

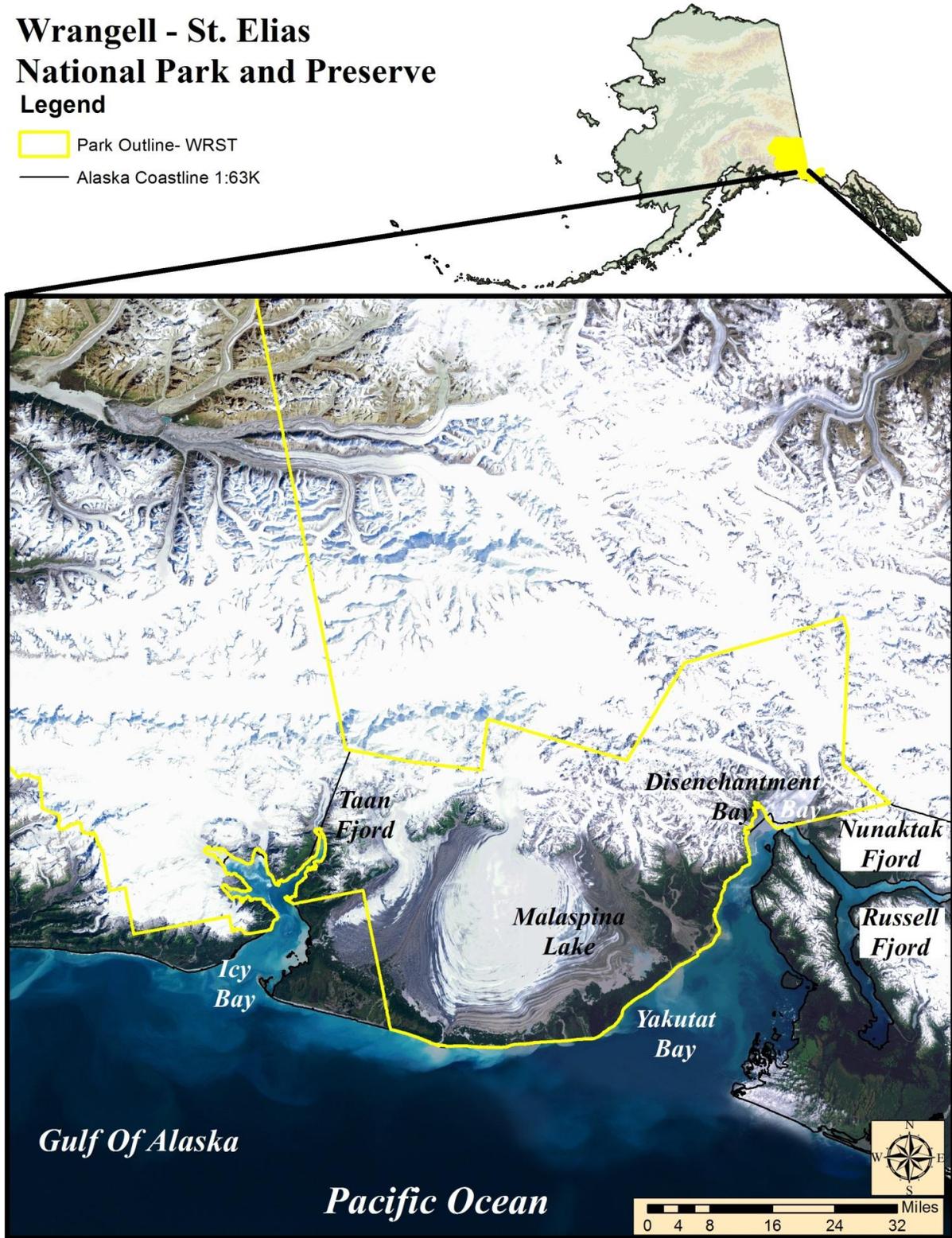
Human dimension

No future human dimension ocean or coastal resources work in LACL has been identified at this time.

Wrangell - St. Elias National Park and Preserve

Legend

-  Park Outline- WRST
-  Alaska Coastline 1:63K



Wrangell – St. Elias National Park and Preserve

WRST is a 8,147,000+ acre park unit located 170 miles east of Anchorage and 10 miles north and west of Yakutat, in south central Alaska, and is accessible by road, plane, and boat. Coastal access is by aircraft and boat. It contains approximately 155 shoreline miles that include wetlands, fjords, and lagoons. The park was established by ANILCA.

Enabling Legislation

Enabling legislation states the monument and preserve shall be managed “To maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and streams, valleys, and coastal landscapes in their natural state; to protect habitat for, and populations of, fish and wildlife including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide continued opportunities including reasonable access for mountain climbing, mountaineering, and other wilderness recreational activities. Subsistence uses by local residents shall be permitted in the park”.

Threats to Park Resources

This section identifies currently known risks and threats that impact, or may impact park coastal resources. This is not an all exhaustive list, but is intended to identify those risks and threats that provide a significant or substantial threat to monument and preserve resources.

Natural

Ocean acidification is a significant resource concern. From the production of zooplankton available to the food chain, to the development of shells in shellfish of the region, the ramifications of ocean acidification can be severe. As birds and mammals rely on coastal resources available prior to the return of the salmon in mid to late June, the loss of shellfish could prove a significant impact to a large population of the fauna within the monument and preserve. These effects would be both direct and indirect through food supply and nutrient input.

Temperature increases in the surface water. Temperature increase in the streams and lakes may have detrimental effects on the salmon runs known to occur within the park; red (*Onocorhynchus nerka*) and pink (*Onocorhynchus gorbuscha*) salmon.

Rapid glacial melting is causing rapid changes in vegetation and vegetated areas. Some vegetation communities are being drowned, and likewise some areas are being opened for vegetation. Without proper invasive species control, the potential for vegetation invasions is high.

Glacial advance of Hubbard glacier causes a damming of Russell Fjord creating Russell lake which drains onto the Yakutat peninsula disrupting salmon and herring fisheries.

Marine invasive species are a significant concern in regards to their ability to alter food webs and system functions as well as cause subsistence resource impacts. Existing marine invasive species are moving up the coast from Canada and more are known to be associated with Japanese tsunami debris. Over 150 species have been identified on tsunami debris to date with

approximately 25% known to be potentially invasive. Invasive tunicates are already found in Sitka Sound and farther north while European green crabs have not quite made it into Alaska.

The aquatic invasive Elodea is beginning to spread throughout the region. A primary vector of spread is floatplane, which is a primary access route to AKR coastal parks. While this has not been identified in WRST as of yet, the potential impact to fisheries is significant in the form of habitat alterations reducing habitat suitability.

There are reports of California sea lions showing up near Yakutat. The impact to marine resources is unknown at this time, but suspected to be limited; however, these species are apex predators and increases in populations will likely impact the system.

Anthropogenic

Marine traffic is of significant concern. Pollution from cruise ships entering Yakutat bay is a source of concern for ecosystem health. Current impacts on lichens are unknown but anticipated. Icy Bay functions as a place of refuge for ships as well as a fuel transfer location for marine vessels. Fuel transfers take place regularly on the water in the bay providing concerns for fuel spills within the bay. There is also concern about the impact cruise ships in Yakutat Bay are having on the associated seal populations. These impacts are unknown, but research in Glacier Bay indicates reductions in reproductive success are potentially possible.

There is a possible concern of seal hunting pressure. Recent studies have indicated that seals that spend part of the time in Icy Bay and Yakutat Bay are also spending time in Glacier Bay. Seal hunting may have an impact on WRST and GLBA seal populations. The degree is unknown.

Marine debris is an ongoing threat to the resources along the park coast. Marine debris can cause damage to both natural and cultural resources. WRST coastal resources include a minimum of six cultural sites and many more suspected which could be damaged or destroyed by marine debris.

There are large numbers of hatchery fish in the Copper river. It is unknown how the hatchery fish are impacting native fishes to the river. Competition for subsistence fishing sites is high and constant once the subsistence season begins. Subsistence fishing is primarily for salmon.

Stream contamination from logging camps along the Malaspina forelands is a concern in several locations. Cleanup requirements have begun, but concern over existing environmental contaminations exists from fuel barrels located within the foreland area.

2012 Work within the Park

The work identified here is the current and ongoing work known to be occurring within the monument and preserve relating to ocean and coastal systems. This is not intended to be a comprehensive listing of all work being accomplished in WRST, rather work specifically designed to enhance the knowledge of the coastal and marine systems.

Biological

Wrangell – St. Elias NP received technical assistance on invasive species: both on land and in marine systems. The Project is titled: Inventory and Monitoring of Coastal and Marine Invasive

Species. The main goal is to try and identify the best methods and process for monitoring slugs, European green crabs, and other invertebrate invasive species.

The SEAN network is conducted Kittlitz's Murrelet and oceanography monitoring studies in Icy Bay in Wrangell- St. Elias NPP.

Alaska Fish and Game is engaged in a 3-4 year study on brown bear movements along the coast of WRST. This project using GPS collars tracks bear movements to understand the range and seasonal habits of the coastal populations in the WRST area.

A USGS fish inventory was conducted on the Malaspina forelands. This was the final year of a 3 year study looking for two different species of smelt: longfin (*Spirinchus thaleichthys*) and rainbow (*Osmerus mordax*). Some limited water quality data was collected during this project.

PMIS project 100904 titled "Evaluate status of Stellar Sea Lions" was approved and funded in FY12 and FY13. The objectives of the project are to determine spatial and temporal Steller sea lion use of WRST lands during the breeding season and to document seasonal foraging and haul out sites. Field work began in FY12 and is continuing.

PMIS project 139004 titled "Understanding population declines of Kittlitz's murrelet in Icy Bay, Wrangell-St. Elias NP" was funded from FY10-FY12 and was completed in FY12. This project aimed to identify the life-history stage of Kittlitz's murrelets where population growth is most likely limited and to identify factors limiting growth. The work will be used to generate an empirically-based population growth model for the purposes of developing a conservation and management plan for the park.

PMIS project 155887 titled "Continuing Research on the Occurrence and Distribution of Coastal and Anadromous Fish in WRST" was funded in FY11 and continued through FY12. This project's goal is to sample coastal freshwater streams for rainbow smelt (*Osmerus mordax*) and longfin smelt (*Spirinchus thaleichthys*) to identify if populations of these fishes are present in the coastal WRST system. This information would feed into the CAKN inventory database and to the Alaska Department of Fish and Game's Fish Habitat Monitoring and Protection System database.

Physical

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol for determining change analysis throughout the state of Alaska is ongoing. This work is being funded by the NPS and has broad implications throughout the state.

Chemical

No chemical ocean or coastal resources work in WRST has been identified at this time.

Human dimension

A portion of PMIS project 156723 was implemented this fiscal year. This project titled Climate Change Scenario Planning for National Parks in Alaska occurred for GLBA, SITK, KLGO and

WRST this year. The climate change scenario planning process used a facilitated workshop to identify planning objectives and processes in relation to futuristic climatic scenarios. Partners included US Forest Service, University of Alaska Fairbanks, the Fish and Wildlife Service, and local communities in the area.

Planned work within the Park

The work identified here is work WRST has applied for funding for or has decided to pursue with funds from future fiscal years.

Biological

Kenai Fjords is requesting technical assistance for a project titled: Kittlitz's Murrelet listing proposal support. The bird is proposed for threatened status with FY 13 being the year in which the listing must be accepted or rejected. The NPS would like to develop a statewide monitoring plan for these birds which occur in most coastal parks in Alaska (known to occur in WRST, GLBA, KEFJ, KATM, BELA, and CAKR). This project is not yet approved

Physical

An agreement with the University of Alaska's Geographic Information Network of Alaska to use MODIS (Moderate Resolution Imaging Spectroradiometer satellite) imagery to develop a phenological change detection method/protocol to that can be used for determining phenological changes throughout the state of Alaska. This work is being funded by the NPS and has broad implications throughout the state. This work is planned to continue in 2013.

Chemical

No future chemical ocean or coastal resources work in WRST has been identified at this time.

Human dimension

No future human dimension ocean or coastal resources work in WRST has been identified at this time.

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The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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