

# IZEMBEK STATE GAME REFUGE MANAGEMENT PLAN



Alaska Department of Fish and Game  
Divisions of Habitat and Wildlife Conservation  
April 2010

## Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mideye to fork	MEF
gram	g	all commonly accepted		mideye to tail fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b> <i>all standard mathematical signs, symbols and abbreviations</i>	
meter	m	at	@		
milliliter	mL	compass directions:			
millimeter	mm	east	E	alternate hypothesis	H <sub>A</sub>
		north	N	base of natural logarithm	<i>e</i>
		south	S	catch per unit effort	CPUE
		west	W	coefficient of variation	CV
		copyright	©	common test statistics	(F, t, $\chi^2$ , etc.)
		corporate suffixes:		confidence interval	CI
		Company	Co.	correlation coefficient	
		Corporation	Corp.	(multiple)	R
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(simple)	r
		District of Columbia	D.C.	covariance	cov
		et alii (and others)	et al.	degree (angular )	°
		et cetera (and so forth)	etc.	degrees of freedom	df
		exempli gratia		expected value	<i>E</i>
		(for example)	e.g.	greater than	>
		Federal Information		greater than or equal to	≥
		Code	FIC	harvest per unit effort	HPUE
		id est (that is)	i.e.	less than	<
		latitude or longitude	lat. or long.	less than or equal to	≤
		monetary symbols		logarithm (natural)	ln
		(U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and		logarithm (specify base)	log <sub>2</sub> , etc.
		figures): first three		minute (angular)	'
		letters	Jan,...,Dec	not significant	NS
		registered trademark	®	null hypothesis	H <sub>0</sub>
		trademark	™	percent	%
		United States		probability	P
		(adjective)	U.S.	probability of a type I error	
		United States of		(rejection of the null	
		America (noun)	USA	hypothesis when true)	$\alpha$
		U.S.C.	United States	probability of a type II error	
			Code	(acceptance of the null	
		U.S. state	use two-letter	hypothesis when false)	$\beta$
			abbreviations	second (angular)	"
			(e.g., AK, WA)	standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
<b>Weights and measures (English)</b>					
cubic feet per second	ft <sup>3</sup> /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
<b>Time and temperature</b>					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees Kelvin	K				
hour	h				
minute	min				
second	s				
<b>Physics and chemistry</b>					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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***IZEMBEK STATE GAME REFUGE MANAGEMENT PLAN***

**Prepared by  
The Division of Habitat  
and  
The Division of Wildlife Conservation**

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**Denby Lloyd, Commissioner**

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**April 2010**

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Alaska Department of Fish and Game  
Anchorage, Alaska*

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## ACKNOWLEDGEMENTS

The *Izembek State Game Refuge Management Plan* has been prepared by Alaska Department of Fish and Game biologists Janet Hall Schempf, Mark Fink, and Tammy Massie (Division of Habitat), and Ed Weiss (Division of Wildlife Conservation). This plan has been developed with the aid of an interagency planning team composed of representatives from state, federal, and local agencies with jurisdiction over the refuge and refuge resources:

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## INTRODUCTION

The Izembek State Game Refuge lies along the northern shore of the Alaska Peninsula, near the community of Cold Bay. The Alaska Legislature established the State Game Refuge in 1972 (§ 1 ch 140 SLA 1972) to protect natural habitat and game populations, especially waterfowl. The State Game Refuge, encompassing approximately 480,396 acres, includes the state lands and waters within the Izembek National Wildlife Refuge (NWR), and also includes tide and submerged land within Izembek Lagoon, which includes Applegate Cove and Moffet Lagoon, and extends as much as three miles beyond the barrier islands (the Kudiakof Islands) into the Bering Sea. A principal feature of the State Game Refuge is one of the largest eelgrass beds in the world; the State Game Refuge is known internationally for the number of waterfowl and shorebirds that feed in the Izembek Lagoon eelgrass beds during spring and fall migrations (Appendix A, Resource Inventory).

With the exception of Izembek Lagoon and the marine waters beyond the Kudiakof Islands, the boundary of the Izembek State Game Refuge overlaps with the Izembek NWR, which is managed by the U.S. Fish and Wildlife Service (USFWS). A portion of the NWR is congressionally designated “Wilderness.” The islets and islands in the lagoons are included in this Wilderness. The dividing line between state and federal jurisdiction is generally the line of Mean High Tide. Determinations of navigability and land exchanges also affect state jurisdiction with the boundary of the SGR.

## PURPOSE

The Izembek State Game refuge is co-managed by the Alaska Department of Fish and Game (ADF&G) in accordance with Alaska Statute 16.20.050-060, and the Alaska Department of Natural Resources (DNR) per AS 38.05. The purpose of the *Izembek State Game Refuge Management Plan* is to provide consistent, long-range guidance to ADF&G in managing the State Game Refuge. Various commercial and recreational activities have occurred in or may be proposed for the State Game Refuge. ADF&G has undertaken this comprehensive planning process in order to establish guidelines, policies, and regulations for management of fish and wildlife, habitat, and current and future activities that affect them on the State Game Refuge.

This plan presents management goals for the State Game Refuge and its resources, and identifies policies to be used in determining whether proposed activities are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. The goals and policies of this plan are adopted as regulation.

This plan affects state lands and waters only. Private lands and federal lands and waters within the boundaries of the State Game Refuge are not subject to State Game Refuge authority. Furthermore, the plan does not address hunting or fishing regulations, which are the authority of the Alaska Boards of Fish and Game.

## THE PLANNING PROCESS

This plan is the result of a public planning process led by ADF&G. It was developed by a planning team representing the following state, federal, borough, and municipal entities: the State of Alaska Departments of Fish and Game, Natural Resources, and Environmental Conservation (DEC); the USFWS, the National Marine Fisheries Service (NMFS), the Aleutians East Borough; and the City of Cold Bay.

This management plan is the product of a collaborative process. Working with local residents, state and borough representatives, and special groups, the planning team established the vision. This vision is created not only from what local residents want or state law requires, but also from an understanding of the problems and resources at hand.

In addition, the planning process was initiated cooperatively with USFWS Izembek NWR staff, which was beginning work on a revision to the Izembek NWR Comprehensive Conservation Plan. The original concept was that the two plans would be developed concurrently for the benefit of the public, as well as the agencies and the resources.

At the beginning of the planning process, joint ADF&G and USFWS public meetings were held in Cold Bay, Nelson Lagoon, King Cove, Sand Point, and Anchorage to explain the planning process and solicit citizen's issues, interests, and concerns for both the State Game Refuge and the NWR. The planning team used public input from these meetings to formulate a list of issues to be addressed in the State Game Refuge plan. At the same time, resource information on the State Game Refuge's fish and wildlife populations and their habitats, other natural resources, existing land use and land ownership was being collected and synthesized. This information, presented in both map and narrative form, comprises the plan's Resource Inventory (Appendices A and F).

Management goals and policies for the State Game Refuge were developed by the planning team to address the identified issues. All policies were developed with consideration of their ability to meet the formulated management goals. In some cases, alternative policies were developed. Each alternative policy was analyzed according to its ability to meet the plan's management goals. In addition, other applicable laws and the Public Trust Doctrine were considered.

The draft revised plan was distributed for public review. Based on comments received during the review period, appropriate changes were made and the Commissioner of Fish and Game adopted the plan for use by the department in managing the refuge.

## **IMPLEMENTATION**

Future refuge management activities of the Alaska Department of Fish and Game will be directed by this plan. Research programs, public use facilities, and other department projects will be consistent with the goals and policies presented in this plan. Similarly, future land use activities within the State Game Refuge, including those proposed by other state agencies, will be approved, conditioned, or denied on the basis of their consistency with the goals and policies provided in the adopted management plan and any applicable state statutes and regulations. Land use, management, and research activities within the State Game Refuge will also be conducted in accordance with the Supplemental to the Master Memorandum of Understanding between ADF&G and FWS (Appendix E).

A Special Areas Permit is required for any habitat altering work, including any construction activity, or any activity which disturbs fish or wildlife other than lawful hunting, trapping, fishing, and viewing in a designated state game refuge (5 AAC 95). A Special Areas Permit application form can be obtained from any ADF&G office or the department Web site (<http://www.adfg.state.ak.us>); the completed application should be submitted to the Division of Habitat office in Anchorage.

Other state, federal, and local agencies have management responsibilities that affect the State Game Refuge as well. Many uses, including lease or disposal of resources on state land in the State Game Refuge require Department of Natural Resources authorization. Activities affecting air or water quality may require authorization from the Department of Environmental Conservation. The U.S. Army Corps of Engineers evaluates applications for permits for activities affecting navigable waters and for the discharge of dredged and fill material in waters of the United States, including wetlands. Various federal and state agencies, along with local governments, review proposals for federal permits, pursuant to the Fish and Wildlife Coordination Act (16 USC 661-667 et. seq.), Coastal Zone Management Act, and the Alaska Coastal Management Program. The Aleutians East Borough and the City of Cold Bay may review and provide recommendations on all permit proposals within or affecting the coastal zone, including the Izembek State Game Refuge.

This plan will be reviewed and updated, as appropriate and necessary. Public participation will be solicited during the update process.



## STATUTES

Alaska Statute 16.20.020 establishes the purpose of state game refuges (§ 1 ch 114 SLA 1960). The 1972 legislation which created Izembek State Game Refuge amended AS 16.20.030 (§ 1 ch 140, SLA 1972). The language of these two statutes, specific to Izembek State Game Refuge, is presented here.

### Purpose of State Game Refuges

#### § 16.20.020. Purpose.

The purpose of AS 16.20.010 - 16.20.080 is to protect and preserve the natural habitat and game population in certain designated areas of the state.

### Izembek State Game Refuge

**§ 16.20.030. National wildlife refuges designated as state game refuges.** (a) The land areas now included in the National Wildlife Refuge System that are cited in this subsection are designated state game refuges, and the board shall assign them appropriate refuge names:

(14) Izembek Refuge, including the tide and submerged land described as follows:

(A) Township 58 South, Range 91 West, Seward Meridian

Sections 1 - 4

Sections 9 - 12

(B) Township 58 South, Range 90 West, Seward Meridian

Sections 1 - 9

Section 16

(C) Township 57 South, Range 91 West, Seward Meridian

Section 13

Sections 24 - 26

Sections 35 - 36

(D) Township 57 South, Range 90 West, Seward Meridian

Sections 1 - 36

(E) Township 57 South, Range 89 West, Seward Meridian

Sections 5 - 6

(F) Township 56 South, Range 87 West, Seward Meridian

Sections 1 - 6

Sections 10 - 11

(G) Township 56 South, Range 88 West, Seward Meridian

Sections 1 – 23

Sections 27 - 32

(H) Township 55 South, Range 87 West, Seward Meridian

Sections 1 - 36

(I) Township 56 South, Range 89 West, Seward Meridian

Sections 1 - 36

(J) Township 55 South, Range 89 West, Seward Meridian

Sections 1 - 36

(K) Township 55 South, Range 88 West, Seward Meridian

Sections 1 - 36

(L) Township 55 South, Range 86 West, Seward Meridian

Sections 6 - 7

Sections 18 - 19

Sections 30 – 31

(M) Township 56 South, Range 90 West, Seward Meridian

Entire township.



# **IZEMBEK STATE GAME REFUGE MANAGEMENT PLAN**

## **GOALS**

Activities occurring within the Izembek State Game Refuge will be consistent with the following goals in accordance with the purpose for which the area was established (Alaska Statute 16.20.020). All department management decisions in the Izembek State Game Refuge, whether affecting activities undertaken by the department, other agencies, or the public, will be in accordance with these goals.

### **Goal I. Fish and Wildlife Populations and their Habitats**

- A. Manage the State Game Refuge to maintain and protect fish and wildlife populations and their natural habitats. Minimize the degradation and loss of habitat values due to habitat fragmentation. Minimize unnecessary disturbance to fish and wildlife, especially to marine mammals and nesting, rearing, staging and wintering waterfowl, shorebirds, and seabirds.
- B. Maintain, protect and, if appropriate, enhance the quality and quantity of habitat for naturally occurring resident and migrant fish and wildlife, particularly nesting, rearing, staging and wintering habitat for waterfowl, shorebirds, sea otters, harbor seals, sea lions, and important fish and shellfish rearing and spawning habitat.
- C. Protect natural substrate, aquatic vegetation, water quality and quantity, and water circulation patterns to maintain aquatic habitats, especially the eelgrass beds that provide food, shelter, and nutrients to numerous fish and wildlife species. Manage and protect the eelgrass beds that contribute to the Lagoon's status as an international crossroads for migrating waterfowl and shorebirds from four different North American flyways as well as South American, Asian, and Pacific oceanic flyways.
- D. Maintain water quality sufficient for the growth and propagation of fish, shellfish, and other aquatic life in fresh, estuarine, and marine waters.
- E. Recognize the potential for cumulative impacts when considering effects of small incremental activities and actions affecting refuge resources, including high frequency public use activities. (Public use means commercial and public, non-agency use.)

### **Goal II. Public Access and Use**

- A. Allow public uses when the uses are compatible with the management goals and policies identified in this plan.
- B. Maintain or improve public access to and within the State Game Refuge consistent with the goals of this management plan.
- C. Maintain opportunities for hunting, fishing, and trapping in the State Game Refuge, as allowed by the Alaska Board of Fisheries and the Alaska Board of Game.
- D. Support, maintain, and enhance opportunities for wildlife viewing, photography, and study of fish and wildlife and their habitats in the State Game Refuge.
- E. Provide information about the State Game Refuge to the public and enhance education opportunities.

### **Goal III. Management, Research, and Other Activities**

- A. Encourage and support research, monitoring, and enforcement activities necessary to achieve the goals and policies of the Izembek State Game Refuge Management Plan, as funding allows.
- B. Foster interagency cooperation and coordination with the USFWS, Izembek NWR to assist in implementation of this management plan.
- C. Use the most appropriate methods and means consistent with resource and habitat protection to accomplish management activities.
- D. Manage other uses in the refuge in a manner compatible with the primary purpose of conserving fish and wildlife populations and habitats in their natural diversity consistent with the goals and policies of this management plan.

## **POLICIES**

The policies provided in this plan are used to guide ADF&G decisions on management activities and Special Area Permits for activities on state land and water within the Izembek State Game Refuge. When reviewing a proposed activity to determine whether a Special Area Permit will be issued, the proposed activity must be evaluated against the applicable goals and policies of the management plan. The compatibility policy is always used to evaluate whether a proposed activity is compatible with the purposes for which the refuge was established.

### **COMPATIBILITY**

Uses and activities may be allowed in the State Game Refuge when the proposed uses and activities are compatible with the purposes for which the refuge was established and the goals and policies of the management plan. Uses and activities will be restricted as necessary to 1) maintain diversity and abundance of waterfowl, marine mammals, and other fish and wildlife, 2) avoid unnecessary displacement or disturbance of waterfowl, marine mammals, or other fish and wildlife; 3) prevent impacts to eelgrass beds and other habitats; and 4) maintain or enhance public access to refuge resources.

### **ACCESS**

The department will maintain existing public access for continued public use and research and develop complementary access guidelines with USFWS Izembek NWR. Except for a boat launch ramp near Grant Point, access sites will remain in an undeveloped state. Airstrips will not be allowed.

### **MOTORIZED VEHICLES**

The use of motorized vessels within Izembek Lagoon requires a Special Area Permit. Motorized vessel use, including but not limited to hunting, fishing and recreation, will be managed by General Permit or by individual Special Area Permit. The off-road use of wheeled, tracked, or other ground effect motorized vehicle requires a Special Area Permit. The use of off-road vehicles will not be authorized in vegetated intertidal areas. When necessary to protect fish and wildlife habitat, ensure the conservation of fish and wildlife populations, or maintain compatible public recreation, motorized access may be restricted.

Fixed-wing aircraft landings within Izembek Lagoon and all helicopter landings within the State Game Refuge require a Special Area Permit. With the exception of the unvegetated sand bar at the mouth of Joshua Green River, aircraft landings inside Izembek Lagoon are generally prohibited. Fixed-wing aircraft landings in Izembek Lagoon (with the exception of landings at the mouth of Joshua Green River) and helicopter landings in the State Game Refuge may be authorized only if the use fulfills a demonstrable need and for which there is no feasible alternative.

The public use of personal watercraft, air-cushion vehicles, and airboats is not allowed in Izembek Lagoon. However, the department may, in its discretion, issue a Special Area Permit allowing the use of personal watercraft, air cushion vehicles, and airboats for management or research purposes in Izembek Lagoon only when the use of these vehicles fulfills a demonstrable need and for which there is no feasible alternative.

For the purposes of this policy “personal watercraft” is defined as: 1) a vessel that is less than 16 feet in length; 2) propelled by a water-jet pump or other machinery as its primary source of motor propulsion; and 3) designed to be operated by a person sitting, standing, or kneeling on the vessel, rather than by a person sitting or standing inside it.

## **INFORMATION/EDUCATION**

The department will provide information to State Game Refuge users and the general public regarding State Game Refuge resources and use restrictions. The department will encourage and support cooperative information and education projects with the USFWS Izembek NWR.

## **SCIENTIFIC RESEARCH**

The department will encourage scientific research of fish, wildlife, habitats, and other resources to facilitate management of the area. The department will develop research priorities and help identify sources of funding in cooperation with USFWS, U.S. Geological Survey, NOAA, NMFS, and other entities.

## **CULTURAL, ARCHÆOLOGICAL, AND HISTORIC RESOURCES**

The department will protect cultural, archæological, and historic resources located within the refuge. Where appropriate, the department will allow legal investigation of cultural, archæological, and historic resources through a Special Area Permit.

## **HABITAT AND POPULATION ENHANCEMENT**

The department will, as appropriate, allow enhancement of naturally occurring fish and wildlife species and their habitats when enhancement restores or improves refuge resource values (including diversity and abundance), and does not reduce the quality of public use and enjoyment of the State Game Refuge.

## **RECREATIONAL ACTIVITIES**

The department will allow low intensity recreational activities (including wildlife viewing, fishing, and hunting) within the State Game Refuge. Use levels may be managed through the issuance of Special Area Permits, if necessary, to avoid adverse impacts to fish and wildlife populations and their habitats.

For the purposes of this policy “low intensity” is defined as “insignificant or inconsequential.”

## **STRUCTURES**

The department will prohibit permanent structures, except for those necessary to protect and manage refuge resources. Temporary structures, such as mooring buoys, navigation aids, duck blinds, research and management equipment, and herring pounds, may be authorized by Special Area Permit. These structures will not be permitted at access points and other areas if they interfere with the public’s ability to access and use an area. All other temporary structures, such as floating lodges, floating camps, and docks will be prohibited except for those necessary to protect and manage refuge resources.

For any permitted structure, all materials must be removed from the State Game Refuge at the end of the permitted operations; off-season storage of materials will not be authorized. Structures will be sited and constructed consistent with the primitive character of the area.

## **OIL AND GAS**

The department will not allow surface entry for oil and gas exploration and development, with the exception of seismic surveys, in the Izembek State Game Refuge. Surface entry for seismic surveys may be allowed in the State Game Refuge through the issuance of a Special Area Permit.

## **MINING**

The department may allow mining of valid mining claims or leaseholds under terms and conditions of a Special Area Permit. The department will prohibit recreational mining within the State Game Refuge.

## **MATERIAL EXTRACTION**

The department will prohibit material extraction (sand and gravel removal) within the State Game Refuge unless for purposes of maintenance, enhancement, restoration, or management of the refuge. Impacts of material extraction activities within the refuge will be fully mitigated including, rehabilitation and restoration, as appropriate.

## **HAZARDOUS SUBSTANCES AND PETROLEUM-BASED FUEL**

The department will prohibit storage or disposal of hazardous substances (as defined in AS 46.09.900) and petroleum based fuels in the State Game Refuge.

This policy does not apply to fuel on board vessels, vehicles or aircraft, or to fuel contained within authorized structures.

## **ROADS/DOCKS/PIPELINES/UTILITY LINES**

The department will prohibit construction of roads, pipelines, utility lines, or docks in Izembek Lagoon. Construction of developed boat ramps and trails in Izembek Lagoon may be allowed when it fulfills a demonstrable public need and for which there is no feasible alternative. Construction of roads, pipelines, utility lines or docks within the remainder of the State Game Refuge may be authorized, when it fulfills a demonstrable public need and for which there is no feasible alternative.

Construction of a road through the State Game Refuge to connect King Cove to Cold Bay may be authorized under terms and conditions of a Special Area Permit, pursuant to current statutory and regulatory authority, or as amended by future state legislation.



## **IMPLEMENTATION**

The *Izembek State Game Refuge Management Plan* will be implemented by the Alaska Department of Fish and Game through its day-to-day management activities, through its annual budgetary process, and through Special Area Permits issued for land use activities in the State Game Refuge.

### **SPECIAL AREA PERMITS**

A Special Area Permit is required for any habitat-altering activity, including construction work, or any activity which disturbs fish or wildlife other than lawful hunting, trapping, and fishing in the Izembek State Game Refuge. Project reviews are conducted by habitat biologists in coordination with other division staff. Department biologists use available supporting scientific data and best professional judgment to determine if a proposed activity will be compatible with the statutory purpose of the refuge and the goals and policies identified in the management plan; and hence should be permitted. The permitting biologist often reviews similar previously issued permits to maintain consistency. Permitting decisions may be appealed through the elevation process (5 AAC 95.920 and AS 46.62.330-630).

A Special Area Permit application form can be obtained from any Alaska Department of Fish and Game office or the department's website at <http://adfg.state.ak.us/>; the complete application should be submitted to the Division of Habitat office in Anchorage (5 AAC 95).

### **LOCAL KNOWLEDGE**

Once the plan is completed, department staff will continue to work with users of the area to apply local information and knowledge to management of the refuge, consistent with the purposes for which the refuge was established.

### **PUBLIC ACCESS**

Watercraft Use in the Refuge: Impacts to refuge habitat and disturbance and displacement of waterfowl from increasing boat traffic, particularly from large horsepower outboard engines, shallow draft boats, and commercial fishing boats, have been identified as a growing concern in the refuge during the development of the management plan. The department will solicit information on, and to the extent possible, monitor use of powerboats in the refuge, in coordination with USFWS Izembek NWR, to assess the effects of current and potential future levels of disturbance to wildlife populations and their habitats.

As necessary, the department will develop rules and regulations governing the use of powerboats in the refuge to protect habitat and avoid disturbance and/or displacement of wildlife at such time as sufficient information is available.

Aircraft Use: Department staff will monitor aircraft use in the State Game Refuge to determine levels and purposes of aircraft use, and identification of areas needing more management attention. The department will evaluate the need for aircraft access in relation to sensitive habitats and species, seasonal use by fish and wildlife, public use activities, and public safety. Additional policies and regulations may be considered as necessary.

In addition, the department will coordinate with the FAA and the USFWS Izembek NWR to encourage and request pilots to maintain a minimum altitude of 2,000 feet above the surface of the State Game Refuge, as identified in FAA Advisory Circular 91-36C, “Visual Flight Rules (VHR) Flight Near Noise Sensitive Areas.” The minimum altitude advisory would not apply to aerial surveys conducted for fish and wildlife management and research.

## **INFORMATION/EDUCATION**

The department will work with government agencies and private groups to develop an information/education program for the refuge that will inform the public about resource values, rules, and recreational opportunities. The department will work with the US Coast Guard, air charter operators, and the FAA to explain aircraft access limitations.

## **ARCHÆOLOGICAL/HISTORIC RESOURCES**

The department will encourage a comprehensive inventory of archæological and historic resources in the State Game Refuge by appropriate qualified authorities.

## **FISH AND WILDLIFE ENHANCEMENT AND RESTORATION PROJECTS**

Refuge enhancement and restoration projects will be developed in accordance with the goals and policies of this management plan through a public decision making process.

## **BOUNDARY ADJUSTMENTS**

The department will coordinate with the Alaska Department of Natural Resources to prepare a recommendation to the legislature to expand the boundaries of the State Game Refuge to encompass all of the tidelands and waters within Izembek Lagoon; tidelands, submerged lands, and waters in other waters supporting eelgrass beds within or adjacent to the State Game Refuge, including Kinzarof Lagoon; the Steller’s eider critical habitat along the Alaska Peninsula shoreline, and the state land and water surrounding Amak Island and Sea Lion Rocks.

### **Background**

The boundary Congress designated in 1960 for the Izembek National Wildlife Range included lands surrounding Norma Bay, Applegate Cove, Izembek Lagoon, Moffet Lagoon, and Kinzarof Lagoon as well as the watersheds of these areas, though the tidelands and submerged lands belonged to the State of Alaska. In 1972, the Alaska Legislature designated the state lands and waters within the Izembek National Wildlife Refuge and 156,400 acres (63,293 ha) of tidelands and submerged lands within Izembek Lagoon as the Izembek State Game Refuge (Alaska Statute 16.20.030(a)(14); 09/24/1972). The boundary for the new state refuge also includes the marine waters extending seaward of the barrier islands of Izembek Lagoon. A map of the Izembek State Game Refuge is shown in Map 1: Izembek Boundary Map, and Map 2: Izembek Land Status shows the land status of Izembek State Game Refuge as of January 2009.

### **Boundary Irregularities and Incomplete Land Status Maps**

A number of irregularities of map projections cause some difficulties with understanding land status in Izembek Lagoon. The statutory boundary currently does not contain all of the state submerged and tidelands within the Izembek Lagoon. Furthermore, the state land status plats, except one, for the area that includes the State Game Refuge have not been created, so BLM



Master Title Plats (MTPs) are all that exist. When state status plats are created for this area, the State Game Refuge boundary and Bristol Bay Area Plan land classification order will be shown.

The U.S. Air Force holds a 91.83-acre reservation for Distance Early Warning line radar site COB-M near Grant Point (Map 2). While the land status information shows the reservation in the intertidal area, the facility is located on uplands.

#### Private Lands or Claims

There are several Native allotment applications or patents, or private inholdings within Izembek State Game Refuge, and several Native 14(h)(1) cemetery sites are located on the eastern side of Izembek Lagoon (Map 2). No mining claims, oil and gas leases, or RS 2477 Rights-of-Way exist within the legislatively designated boundary.

#### Steller's Eider Critical Habitat

The U.S. Fish and Wildlife Service has designated an area along the Alaska Peninsula as Steller's eider critical habitat. Much of this area is also used by sea otters, though critical habitat for sea otters has not been designated at this time. Planning team members recommend that this designated area be added to Izembek State Game Refuge to better protect and manage these tidelands and waters to benefit Steller's eiders and sea otters. At a minimum, the expansion should include tide lands, submerged lands, and waters within ¼ mile of shore along the portion of the Alaska Peninsula shoreline which includes the designated Steller's eider critical habitat as shown on the attached map (Map 6, Steller's Eider and Shorebirds).

#### Amak Island and Sea Lion Rocks

Amak Island, 10 miles NNW of Cape Glazenap, is an uninhabited stratovolcano, with a surface area of 1,200 ha, and a maximum elevation of 537 m. A group of islets adjacent to Amak Island, the Sea Lion Rocks, are aptly named.

Amak Island and the Sea Lion Rocks were added to the Aleutians Islands Reservation in the early 1930s, after biologist Olaus Murie recommended that the islands' habitat for birds, sea lions, walruses and sea otters be protected, rather than leased for fox farming. Amak Island and the Sea Lion Rocks are now part of the Alaska Maritime National Wildlife Refuge (AMNWR).

Together, Amak Island and Sea Lion Rocks host significant breeding populations of several seabird species. The island's volcano, Mount Amak, last erupted in 1796. Amak Island is dome-shaped, except that it has a well-formed crater at its center, and the southern margin of Amak is a grassy, apparently wave-cut alluvial plain. Amak Island is unusual in its position, which is significantly north of the main Aleutian volcanic front.

Amak Island and the adjoining Sea Lion Rocks provide nesting habitat for the largest seabird colony in southern Bristol Bay. The islands were first surveyed by Olaus Murie in 1936. At that time, no foxes were present on the island. However, when a team from the AMNWR visited Amak Island in 1973, Red Foxes (*Vulpes vulpes*) were found on the island, having possibly arrived over the ice during an exceptionally cold winter. The presence of foxes has driven major change in the avian fauna since the original survey in 1936, with large ground-nesting species like Glaucous-winged Gulls, Black Oystercatchers, and Tufted Puffins no longer nesting at Amak Island. Populations of other ground-nesting bird species may have been reduced by foxes. Ornithologists rarely visit Amak Island and Sea Lion Rocks, and the most recent data come from an AMNWR survey of the islands in June 2001. The islands are an important regional

cormorant breeding site. The Red-faced Cormorant population at Amak Island has declined since the survey in 1973, but the island remains an important breeding site. In addition to the roughly 1,000 Red-faced Cormorants recorded during the 2001 survey, a further 425 unidentified cormorants (either Red-faced Cormorant or Pelagic Cormorant) were also observed. Substantial populations of Black-legged Kittiwake, Common Murre, and Thick-billed Murre also occur at Amak Island. A small breeding population (3 nests, 16 individuals) of Red-legged Kittiwakes was discovered during the 2001 survey; this species (endemic to the Bering Sea) had previously been recorded nesting at only 5 other sites. Murres were not counted during the 2001 survey. However, a combined count (Common Murres and Thick-billed Murres) carried out in 1973 totaled 8,836 individuals.

The uplands of Amak Island are included in the AMNWR. Planning team members recommend that the state tidelands and waters surrounding Amak Island be added to Izembek State Game Refuge to better implement a landscape approach to resource management.

## **MINING CLAIMS AND LEASEHOLD LOCATIONS**

The department will work with the Department of Natural Resources (DNR) to prepare mineral leasehold location orders for the Izembek State Game Refuge, and also recommend that DNR not offer offshore prospecting permits or leases within the refuge. The department will recommend that the legislature close the refuge to new locatable mineral entry, mineral prospecting, and mineral leasing under AS 38.05.185-38.05.300.

## **ACTIONS OF FEDERAL, OTHER STATE, AND LOCAL AGENCIES**

This plan will also be used by other state, federal, and local decision makers in planning for and making decisions for the State Game Refuge under their respective statutory authorities.

## **FWS MEMORANDUM ITEMS**

The department will coordinate management and research activities with FWS consistent with the FWS/ADF&G Memorandum of Understanding (MOU), the 1986 Supplemental MOU, and any subsequent MOU revisions. This will include issuing Special Area Permits, as needed, for activities on state lands and waters in the State Game Refuge. A list of studies conducted in 2008 can be found in Appendix E.

# REGULATIONS

## Title 5. Fish and Game

### Chapter 95. Fish and Game Habitat

#### Article 5. State Game Refuges

**5 AAC 95.550. Izembek State Game Refuge Management Plan.** The Izembek State Game Refuge goals and policies stated in the Izembek State Game Refuge Management Plan dated April 2010 are adopted by reference. The plan presents management goals and policies for the refuge and the resources that the department will use in determining whether proposed activities in the refuge and sanctuary are compatible with the protection of fish wildlife, their habitats, and public use of the refuge and sanctuary. Under 5 AAC 95.420, a special area permit is required for certain activities occurring in a designated state game refuge. The department will review each special area permit application for consistency with the goals and policies of the management plan adopted by reference in this section. A special area permit for an activity in the Izembek State Game Refuge will be approved, conditioned, or denied based on the criteria set out in the goals and policies stated in the Izembek State Game Refuge Management Plan and on the standards contained elsewhere in this chapter. (Eff. 8/6/2010, Register 195)

Authority:	AS 16.05.020	AS 16.20.020	AS 16.20.050
	AS 16.05.050	AS 16.20.030	AS 16.20.060

**Editor's note:** Copies of the Izembek State Game Refuge Management Plan are available at the Anchorage office of the Department of Fish and Game, Division of Habitat, 333 Raspberry Road, Anchorage, Alaska 99518-1599. In addition, the management plan is available for inspection at the lieutenant governor's office, Juneau, Alaska.

**5 AAC 95.552. Iz embek State Game Refuge.** (a) The following conditions apply to activities in the Izembek State Game Refuge (refuge):

**(1) Off-road use of wheeled, tracked, or other ground-effect motorized vehicles:** the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle is prohibited within the refuge, except that

(A) a general permit may be issued under 5 AAC 95.770 for the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle of less than 1,000 pounds dry vehicle weight in unvegetated intertidal areas;

(B) the commissioner may issue an individual special area permit, on a case-by-case basis, for the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle within the refuge if the applicant shows that the use of the applicable vehicle is

(i) consistent with the goals and policies of the management plan described in 5 AAC 95.550; and

(ii) consistent with the purpose for which the refuge was established;

**(2) Motorized vessel use:** a person must obtain a special area permit before operating a motorized vessel within Izembek Lagoon;

**(3) Personal watercraft, air-cushion vehicles, or airboats:** the use of a personal watercraft, air-cushion vehicle, or airboat is prohibited within Izembek Lagoon, except that the commissioner may issue an individual special area permit, on a case-by-case basis, for the use of personal watercraft, air-cushion vehicles, or airboats for management or research purposes if the applicant shows that the use of the applicable vehicle is

(A) a demonstrable need for which there is no feasible alternative;

(B) consistent with the goals and policies of the management plan described in 5 AAC 95.550; and

(C) consistent with the purpose for which the refuge was established;

**(4) Aircraft access:** a person must obtain a special area permit before landing a fixed-wing aircraft in Izembek Lagoon or a helicopter within the refuge;

**(5) Structures:** a person may not construct a structure, including duck blinds, navigation aids, or other hardened structure, within the refuge unless authorized by a special area permit before the construction begins;

**(6) Mining:** a person may not engage in mining activities within the refuge unless authorized by a special area permit before the mining activity begins;

**(7) Fuel storage and hazardous substances:** the following restrictions apply to fuel storage and the handling of hazardous substances within the refuge:

(A) a person may not release or dispose of a hazardous substance as defined by AS 46.09.900, or petroleum-based fuel in the refuge;

(B) a person may not store fuel in the refuge unless authorized by a special area permit issued before the activity begins; this prohibition does not apply to

(i) fuel contained in fuel tanks on board vessels, vehicles, or aircraft;

(ii) fuel actively used in a camp; and

(iii) fuel contained within permitted structures.

(b) In this section, “personal watercraft” has the meaning given in 5 AAC 95.310(b).

(Eff. 8/6/2010, Register 195)

Authority: AS 16.05.020

AS 16.20.020

AS 16.20.050

AS 16.05.050

AS 16.20.030

AS 16.20.060

**APPENDIX A**  
**RESOURCE INVENTORY**



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# **Izembek State Game Refuge Management Plan**

## **Appendix A Resource Inventory**

by

**Janet Hall Schempf and Tammy Massie, Division of Habitat  
and**

**Tom Rothe and Ed Weiss, Division of Wildlife Conservation**

April 2010

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Alaska Department of Fish and Game

Divisions of Habitat and Wildlife Conservation







# RESOURCE INVENTORY

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# **IZEMBEK STATE GAME REFUGE RESOURCE INVENTORY**

## **INTRODUCTION**

The Izembek State Game Refuge (SGR) was created by the Alaska State Legislature in 1972 (§1 ch 140 SLA 1972). The refuge lies at the westward end of the Alaska Peninsula, and includes open water and lagoon environments.

The Izembek SGR is in a productive area that supports a diverse array of wildlife, commercially important marine resources, and ecologically significant marine organisms. More than 30 species of groundfish and shellfish depend upon the area for critical phases of their life history. King and Tanner crabs, as well as shrimp, halibut, yellowfin sole, and Pacific herring are only a few of the commercially important fish and shellfish harvested in the area.

The unique habitats of the refuge attract large numbers of resident and migratory birds, particularly waterfowl and shorebirds, constituting one of the most important ecological sites for waterbirds in North America. Several species of waterfowl have an absolute dependency on the state game refuge and adjacent Izembek National Wildlife Refuge (NWR), and many species stop on the refuge during migrations between Asia and North America.

Killer, humpback, gray, and minke whales, harbor seals, sea lions, otters, and walruses are present in the offshore waters of the refuge and the surrounding Bering Sea and Bristol Bay.

The high primary productivity of the general area is generated by the exchange of nutrients and physical dynamics between the Bering Sea and terrestrial habitats supporting extensive eelgrass beds in the coastal lagoons.

Human activities include hiking, wildlife viewing and photography, recreational boating, sport and commercial fishing, hunting, marine transportation, and scientific research.

## **THE SETTING**

The Izembek SGR lies along the north side of the Alaska Peninsula at 55° 15' N and 163° 00' W and is approximately 634 miles (1,020 km) southwest of Anchorage (Map 1). The Refuge lies entirely within the Aleutians East Borough, and a small portion of the SGR is within the corporate boundaries of the City of Cold Bay (population 88 in 2000 census).

The Izembek SGR encompasses about 157,286 acres of tide and submerged land that are under state jurisdiction and 323,110 acres of uplands which are in Izembek NWR and under the federal USFWS's jurisdiction. The total area legislatively designated as Izembek SGR is 480,396 acres. The tide and submerged lands of the SGR include coastal lagoons, the beds of navigable waterways, and open water. The lagoon portion of Izembek SGR stretches from Moffet Lagoon to Applegate Cove and Norma Bay, collectively known as Izembek Lagoon; and the Bering Sea portion extends beyond the Kudiakof Islands toward Amak Island.

The Izembek National Wildlife Range was established in 1960 by Public Land Order 2216 as a wildlife reserve. The Range became Izembek NWR in 1980, when the Alaska National Interest

Lands Conservation Act (ANILCA) became law. ANILCA also designated 300,000 acres of the new federal refuge as “wilderness.” These wilderness lands include the islands surrounded by waters of the Izembek SGR. The purposes of the NWR provided by ANILCA are:

- i. to conserve fish and wildlife population and habitats in the natural diversity including, but not limited to, waterfowl, shorebirds, and other migratory birds, brown bears, and salmonids;
- ii. to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- iii. to provide, in a manner consistent with purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- iv. to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in subparagraph (i), water quality and necessary water quantity within the refuge.

Management direction for the general state lands in the Izembek area is provided by the Bristol Bay Area Plan, adopted by the commissioner of the Department of Natural Resources in 2005. The Alaska Department of Fish and Game has the lead role in management of state lands within the Izembek SGR. Management direction for state tidelands, shorelands and waters within the refuge is provided by the Izembek State Game Refuge Management Plan. Large portions of the planning area are within the NWR. The intertwined geography between the Izembek SGR and Izembek NWR requires closely coordinated management by state and federal agencies, and in 1986, a Supplemental Memorandum of Agreement was signed by the US Fish and Wildlife Service and the Alaska Department of Fish and Game (Appendix E).

## **AREA DESCRIPTION**

Izembek SGR lies along the northern side of the Alaska Peninsula, in the southern part of the Bering Sea and near outer Bristol Bay. In this area, the Alaska Peninsula forms a narrow strip of between the Bering Sea and the Pacific Ocean.

The Izembek NWR forms the watershed for Izembek Lagoon, including Moffet Lagoon, and Applegate Cove. The refuges share a coastline with deeply indented bays and numerous small islands. The lagoon portion of Izembek SGR is adjacent to a lowland that extends from the north side of the Alaska Peninsula and rises southward to the low mountains of the Aleutian Range, including Mt. Frosty (Frosty Peak) (elevation 6,600 feet), Mt. Dutton (4,834 feet) and the Aghileen Pinnacles (4,800 feet).

Amak Island, a stratovolcano, lies west of the northernmost part of the Izembek SGR. The island's volcano, Mount Amak, last erupted in 1796. A significant portion of the SGR lies between Amak Island and the shoreline of the Izembek NWR on the Alaska Peninsula and the Kudiakof Islands.

## **THE LAGOONS**

The most prominent feature of the Izembek SGR is Izembek Lagoon, which includes Moffet Lagoon and Applegate Cove. The lagoon is a shallow, complex system of tidal channels and mud and sand flats, surrounded by beaches and bluffs on the inland shores and by spits and sandy barrier islands on the seaward side. Izembek Lagoon is a 30-mile long shallow water embayment, containing 96,000 acres of brackish water, which opens to the Bering Sea. The

lagoon provides habitats for a diverse and abundant community of fish and wildlife species. About 78% of the lagoon area consists of mud flats and 22% tide channels (Ward et al. 1997). Water depths in the lagoon vary from about 1 m to 5 m in the estuarine channels; depths are greatest in the openings between main points and barrier islands, where water flows between the lagoon and the Bering Sea. The mean tidal range of Izembek Lagoon is 3.23 feet; the diurnal range is 4.5 feet (Selkregg et al. 1975).

The lagoon and adjacent coastal waters and wetlands form the foundation for a rich coastal ecosystem. The lagoons comprise one of the world's most important migratory bird staging habitats and contain the largest eelgrass bed in the world (McRoy 1966; Ward et al. 1997). The streams and lagoons of Izembek SGR also provide important nursery and spawning habitats for the rich fishery resources of the Bering Sea.

Eelgrass dominates the lagoon habitats and is critical to staging waterfowl (Map 4). Shallow water and deep water eelgrass beds are differentiated during low tide cycles; shallow eelgrass beds become isolated in tide pools at low tide while deep eelgrass remain hydrologically connected (Tack 1970 summarizing McRoy 1966). At low tide, the lagoon also has extensive areas of exposed sand and mud flats, which are unvegetated. The channel areas are unvegetated but are continually water covered.

Izembek Lagoon, including Norma Bay, Applegate Cove and Moffet Lagoon, serves as an international crossroad to migrating waterfowl and shorebirds. The world's population of Pacific brant is highly dependent on eelgrass and the security of the lagoon during spring and fall; thousands of cackling geese roost and feed on the lagoon between upland foraging trips; and other waterfowl congregate on Izembek Lagoon from late July through early November. Each spring and fall the entire population of emperor geese migrates through Izembek, with several thousand wintering here. The colorful Steller's eider, a federally listed threatened species, nests on the Arctic coast of Alaska and Siberia, molts on Izembek Lagoon from late July through September, and is the most common wintering duck. The intertidal mudflats and beaches of Izembek State Game Refuge and Izembek NWR provide the final opportunity for many migrating shorebirds to feed and rest before their long over-water flights to wintering areas as far away as South America, Polynesia, and New Zealand.

Numerous species of seabirds and marine mammals inhabit the surrounding marine environment, including: harbor seals; sea otters; Steller sea lions; and gray, killer, and minke whales. The area is also home to many species of land birds and mammals that use lagoon and shoreline habitats, including: Tundra swans; ptarmigan; bald eagles; snow buntings, gray-crowned rosy finches, Lapland longspurs, and other migratory songbirds; peregrine falcons; and ravens. Brown bears, red foxes, mink, and river otters feed at salmon-rich streams and intertidal areas. Other mammals on the Arctic-alpine landscape include caribou, wolves, river otter, mink and wolverine. Small mammals such as Arctic ground squirrels, voles, and shrews flourish in the tundra. Less common are tundra hares, jumping mice, and lemmings.

## **CLIMATE AND WEATHER**

The southern Alaska Peninsula has a polar maritime climate where high latitude weather extremes are moderated by proximity to the ocean. Typically, winters are cold and stormy and summers are mild and cloudy. However, the moderating effects make it difficult to define the seasonal periods in the Izembek area. The beginning of spring is "late", and the vegetation does not begin to grow until late May or early June. Shrubs usually do not leaf-out until the middle of

June. Summers are characterized by drizzle and occasional fog and August is regarded as the mid-summer period. Autumn arrives in early October and is usually the wettest season. The first frost usually occurs in October or November. In winter, snow often alternates with rain. Sea ice can form in the coastal lagoons and bays during the winter. During harsh winters, Izembek Lagoon will freeze to the bottom. Severe storms can occur year round and are often accompanied by intense winds.

The annual temperature range at Cold Bay Airport (Western Regional Climate Center) is usually from 25–60°F (-4–16 °C). Below-zero temperatures are infrequent but low temperatures are often aggravated by cold winds (Table A1). The mean annual wind speed at Cold Bay is 17 mph (27 km/hr) although wind speeds can exceed 50 mph (80 km/hr) during any given month, with gusts up to 95 mph (57 km/hr). Winds most commonly come from South-Southeast, though other directions are frequently recorded (Table A1). Wind speeds at given locations can vary considerably depending on the local terrain.

Frequent cyclonic storms from the Northern Pacific and the Bering Sea bring persistent clouds, high winds, moderate temperatures, and a constantly changing weather pattern. Sea winds with a high moisture content blow across the Alaska Peninsula from both oceans. Precipitation is frequent but not abundant. The average rainfall at Cold Bay is 36 inches (91 cm) per year. Cloudy weather is the norm, with only about 12 days of clear skies per year at Cold Bay. Visibilities are frequently restricted during the winter months due to blowing snow (Table A1).

The shortest day of the year at Cold Bay has 7 hours and 7 minutes of daylight, while the longest day has 17 hours and 27 minutes of daylight.

## **HYDROLOGY, OCEANOGRAPHY, AND COASTAL PROCESSES**

The barrier islands, Operl and Neumann Islands, and the spits connected to Cape Glazenap and Moffet Point provide some protection to Applegate Cove, Izembek Lagoon, and Moffet Lagoon from Bering Sea storms.

The nearest major connection between the shelves of the North Pacific Ocean and the eastern Bering Sea is Unimak Pass. The flows through this pass may be modulated by the seasonal cycle of freshwater discharge along the Alaska Peninsula to the west coast of Alaska. Some nutrients flow into the Bering Sea through Unimak Pass; geostrophic transport is believed to be northward from the Gulf of Alaska onto the Bering Sea shelf. Flows along the 50 m isobath are called the Bering Coastal Current. The magnitude and temporal variability in the current, and the water properties, including nutrient concentrations and water temperatures, that are transported northward from the Gulf of Alaska onto the eastern Bering Sea shelf influence the biological productivity of the area, but the mechanisms are not completely understood (Stabeno et al. 2005). Study results also show that Bristol Bay does not recycle well, and that contaminants introduced to the system will remain there, unlike the heavily flushed Prince William Sound.

Researchers believe tidal flushing provides the currents in Applegate, Izembek, and Moffet Lagoons. Silts produced along the coast and delivered by freshwater streams and rivers settle in bays; over time the bays become shallower. No other current studies are known to have been conducted in the area, and coastal processes are largely speculative.

Research shows (Hunt et al. 2002; others) that the southeastern Bering Sea shelf has undergone a warming of approximately 3°C during the last decade. Researchers anticipate that warming of the eastern Bering Sea shelf will affect the Bering Sea ecosystem in many ways, including modification of the timing of the spring phytoplankton bloom, the northward advance of subarctic species, and the northward retreat of arctic species.

Izembek SGR is located in an area at risk for ballast water pollution from ships using a nearby oceanic shipping route as well as more localized boat traffic. Some level of risk exists from payload/cargo pollution should ships break apart or wash ashore. Invasive or non-native plants and animals may also be introduced through ballast water pollution or ship wrecks.

## **GEOLOGY & SOILS**

The geology of the lower Alaska Peninsula has been much influenced by volcanism, glaciation, and marine deposition. The Pacific Ocean crustal plate descends under the North American plate at the Aleutian Islands, resulting in considerable tectonic and seismic activity.

The northwestern half of the Alaska Peninsula consists of Tertiary sedimentary rock, overlain by an alluvial covered lowland that forms the coastal plain adjacent to the Bering Sea. The area was covered by ice during glacial advances of the late Pleistocene Age (USFWS 1985). The hypothetical limit of glacial advance includes all tide and submerged lands within the Izembek SGR. Surficial geology of the broad coastal plains of Izembek NWR consists primarily of glacial outwash (undifferentiated till and stratified dirt) and moraines deposited during the last glacial period (Selkregg et al. 1975; USFWS 1985). This area has poorly drained lakes, meandering streams, wetlands, rounded hills, and low rolling tundra.

The formation of the lagoons within Izembek SGR is believed to be the result of an emerging coastline; probably the result of tectonic activity in the seismically active Aleutian ranges. Emergence of the coastline coupled with the action of winds, tides, offshore currents, sediment deposition and wave action have resulted in the formation of the existing embayment. The lagoons are shallow complex systems of tidal channels and mud and sand flats, surrounded by beaches and bluffs on the inland shores and by spits and sandy barrier islands on the seaward side. These consist primarily of alluvium (recent stream and beach deposits) and dune sand. The barrier island and spit systems have been formed by a net alongshore transport of material moving northeast along the coast of the Alaska Peninsula (Sallenger and Hunter 1984). The embayment resulted in the establishment of the extensive eelgrass beds now present.

Volcanic ash, unconsolidated sands, silts, gravel, and decomposed bedrock provide most of the parent material for the soils of the Alaska Peninsula. Soils in the uplands are commonly derived from volcanic ash. Organic soils are associated with wet tundra communities that have poor drainage. These soils consist of sedge peat and sphagnum moss that have not decomposed. Spits and barrier islands consist mostly of sand and clay derived from offshore shelf areas (McRoy 1966). Permafrost probably does not occur in the uplands adjacent to the lagoon.

The sediments in Izembek Lagoon consist of very fine grained sand mixed with silt and clay in the eelgrass beds and predominately fine grained sand with some silt and clay in the channels (Tack 1970).

## **MINERAL RESOURCES**

The Moffet Point area is known to include titanium sands, iron, and gold. Concentrations in Moffet Lagoon are believed to be greater than those at Moffet Point. Additional information is available in USGS report ARDF CB 013.

The 1984 Bristol Bay Plan (BBAP) recommended that the “Izembek NWR” (not State Game Refuge) be closed to new mineral entry. Mineral Closing Order 393 implemented all the 1984 BBAP mineral orders. There is no mention of the Izembek NWR in the order in either the narrative or the marked-up topographic maps. The order included only streams and their 100-foot buffers on either side throughout the planning area.

The 2005 Bristol Bay Area Plan designates tidelands adjacent to the Izembek NWR as part of a Tideland Resource Management Zone; management intent is to protect wildlife and fisheries habitat and harvest consistent with the adjacent upland uses, i.e. the NWR. ANILCA 304(c) closed NWR lands to new mineral entry.

No valid mining claims are known to exist in Izembek SGR, but the refuge is not closed to mining. However, virtually all uplands are closed to mining or mineral entry under federal law. The only possible area for state mining locations to be staked would be the offshore area extending seaward for a maximum of one-quarter mile. The Commissioner of the Department of Natural Resources (DNR) has the power to open or close land within Izembek SGR to new mineral entry under AS 38.05.185 – 38.05.275. The DNR Commissioner has the authority to temporarily close 640 acres of state lands to mineral leasing and new mineral entry where it is determined that mining is incompatible with significant surface resources, in this case fish and wildlife habitat and populations, and public use and enjoyment of those resources. The legislature can permanently close state lands to new mineral entry. Through a separate action, DNR can establish a Leasehold Location Order (LLO) for the refuge to allow mining operations in a manner that may maintain refuge values and may be compatible with the purposes for which the refuge was established.

## **OIL AND GAS EXPLORATION ACTIVITY AND POTENTIAL HYDROCARBON RESOURCES**

Izembek SGR is located within and near areas of interest to petroleum geologists and oil and gas exploration interests. The Amak Basin, located on the Bering Shelf, is west of the refuge. The North Aleutian basin, also known as the Bristol Bay Basin, is located north and east of Izembek SGR. The St. George Basin, in the southern Bering Shelf, is located beyond the Amak Basin, to the west and north. The descriptions of the Amak, North Aleutian (Bristol Bay), and St. George Basins presented by Wiley (1986) include the geology and other information about the basins. The hydrocarbon potential of these basins has been considered by many, for example, Sherwood et al. (2006). Of the 26 oil wells drilled on the Alaska Peninsula between 1902 and 1985, none had commercially viable quantities of oil although several indicated potential for producing natural gas or coal bed methane. Oil and gas exploration and production may pose a number of risks to Izembek SGR resources and to public uses of the resources. For example, access to offshore sites may require aircraft activity over the lagoons and the federally designated Steller’s eider critical habitat. Facilities, such as pipelines, roads, material removal, and port facilities may be necessary.



Very little, if any, hydrocarbon potential is presumed for the refuge. One location on the opposite coastline from Cold Bay is identified by DNR, Division of Oil and Gas as having moderate to high potential for natural gas and low to moderate potential for oil. The AMOCO Cathedral River Unit 1 well was drilled near Herendeen Bay in 1974. This well showed natural gas in tests, but was not commercially viable (ADNR 2005).

The St. George Basin COST No. 1 well (1976) was located about 105 miles southeast of St. George Island. Cold Bay and Dutch Harbor were used as operational bases; helicopters were used to transport personnel, groceries, and lightweight equipment between the rig and Cold Bay. Chartered and commercial air carriers transported personnel, equipment, and supplies to and from the shore base and Anchorage. Information gathered from this test well was used to evaluate the hydrocarbon potential of the area covered by OCS Lease Sale No.70 held April 12, 1983.

OCS Sale 92 Area is north of Izembek SGR; the closest block is over 10 miles offshore but the City of Cold Bay was identified as a primary transportation hub. This 5.6 million acre area was originally offered for sale by the Mineral Management Service in 1988 (ADNR 2005). Twenty-three leases were issued but no wells were drilled due to a moratorium on oil and gas activities in 1989 and a subsequent federal buyback of the leases. Lease Sale No. 214 for the North Aleutian Basin is scheduled to reoffer this area in 2011, under the 2007-2012 OCS Oil and Gas Program.

The Alaska Peninsula Areawide Oil and Gas Lease Sale does not include (but adjoins) Izembek SGR. The Final Best Interest Finding for this lease sale was issued in July 2005 and expires in 2015. Lease tracts are offered for sale annually by the Division of Oil and Gas. Current DNR policy allows for permitted oil and gas exploration in the refuge.

## EELGRASS

Although several lagoons and bays along the northern coast of Alaska Peninsula support eelgrass (*Zostera marina*), Izembek Lagoon is the most notable. The tidal and subtidal portions of Izembek Lagoon contain what may be the largest eelgrass stand in the world, over 34,000 acres in size. An estimated 44-47% of Izembek and Moffet Lagoons is vegetated with eelgrass (Ward, et al. 1997; Map 4). The shallow basins are protected from the direct influence of tides, current, and the action of wind and waves, and form an ideal substrate for the growth of eelgrass (Andrew 1986).

Eelgrass is a perennial flowering seagrass that grows in shallow intertidal areas with soft bottoms. The root and rhizome system remain in place year round and provide stability to the fine sand and clay substrates, while the long, ribbon-like leaves die back annually. Barsdate et al. (1974) estimated that 166,000 metric tons of carbon, 7,400 metric tons of nitrogen and 1,660 metric tons of phosphorous are produced annually in Izembek Lagoon and that nearly all of these nutrients exit the lagoon in the form of detached eelgrass (Andrew 1986). Eelgrass detritus has been recovered more than 90 miles (150 km) from Izembek Lagoon (McConnaughey 1977). Seasonal concentrations of bottom fishes northwest of Unimak Island may be attributable to the nutrients provided to the Bering Sea by the eelgrass beds of Izembek Lagoon.

Eelgrass meadows are ecologically complex systems that support a range of fauna (bacteria, invertebrates, juvenile and adult fish, waterfowl, other birds, and marine mammals) by providing nutrients (eelgrass leaves, seeds, and rhizomes, and supporting prey species populations); shelter (shade, cover, spawning substrate, and attachment surfaces); and physical stability (buffer water currents, hold fine grained sediment in place) (Orth et al. 2006). Seagrasses form important

habitats that stabilize and enrich sediments, and provide important nursery and habitat functions for a variety of estuarine organisms (Phillips 1984).

Eelgrass productivity is dependent on many factors, estimates of minimal recovery time for disturbed seagrass beds range from three to ten years (Sargent et al. 1995). High turbidity can decrease light levels and reduce growth (de Jonge and de Jonge 1992). Suspended sediments, water depth, and water clarity can slow recovery from disturbance when reduced light levels inhibit photosynthesis. Eutrophication from nutrient loading reduces light available for eelgrass growth (Short et al. 1995). Water quality, in terms of temperature, salinity, and nutrient availability contribute to the growth and survival of seagrass (Orth et al. 2006). Sediment composition is also an important factor for the growth of seagrass, as it is both the physical substrate and nutrient source for the plants. Scoured areas that are trenched into substrate and are filled with different sediments (size, composition, etc.) may not readily recover from a disturbance event (Sargent et al. 1995). Current velocity influences the size and distribution of eelgrass beds and conversely eelgrass stands can buffer water velocities (Fonesca et al. 1983). Additionally, eelgrass bed density influences the localized water mixing and transport of suspended particles (Worcester 1995; Abdelrhman 2003). Moderate grazing pressure on above ground biomass and subsequent fertilization with fecal matter (e.g. by black brant) promotes growth (Ferson 2007). Invasive aquatic species present a risk to eelgrass beds through interspecific competition, which may result in reduced growth due to suffocation of the eelgrass, or through physical destruction of habitat (Den Hartog 1994; Hauxwell et al. 2001; Orth 1975).

Eelgrass is extremely important foraging habitat for many migratory waterfowl. Presumably, the birds are seeking food items rich in carbohydrates for the fall migration from Izembek Lagoon to southern sites along the Pacific Flyway and Asia; others are replacing resources depleted during nesting and molting. Prominent grazers of eelgrass include brant, Canada goose, emperor goose, tundra swan, northern pintail, and American wigeon. Some ducks, such as mallard, northern pintail, green-winged teal, consume the eelgrass seeds. Waterfowl commonly strain seeds from bottom sediments; however, birds may also strip seeds from the flower. Wyllie-Echeverria (1999) found that as much as 25% of the yearly seed stock may be eaten by birds.

## **BIRDS**

### **WATERFOWL**

Waterfowl habitat along the Alaska Peninsula is primarily associated with estuarine habitats, in particular the lagoons along the north shore of the Alaska Peninsula (King and Lensink 1971). Many internationally important populations of geese and ducks stage and winter within the Izembek State Game Refuge. The climate is moist and moderate year round, and provides excellent growing conditions for eelgrass (King and Lensink 1971). King and Lensink (1971) ranked the lagoons, separated from the Bering Sea by alluvial island and sand bars, as priority 1-2 for “preservation of coastal marine habitat necessary for migrants.” They identified the, “enormous eelgrass beds, vital to the survival of black brant, emperor geese, perhaps Steller's eider...” Not all bird species eat the eelgrass. Many of them, such as the mallard, northern pintail, and green-winged teal, feast on eelgrass seeds. Others feed on the tiny crustaceans and invertebrates that take shelter and rest within the eelgrass.

Izembek SGR supports a large variety and abundance of waterfowl throughout the year. The Refuge, along with the adjacent NWR, serves as an international crossroad for birds migrating

along the North American Pacific, East Asian-Australasian, and West Pacific Flyways. Large numbers of birds are present on the Refuge during the spring (March/April) and fall (September/October) staging periods, reaching up to the hundreds of thousands. Up to 300,000 geese (including brant, emperor geese, and cackling geese) and 150,000 ducks use Izembek Lagoon in the fall migration (Taylor and Sowl 2008). The most important staging areas on the Refuge include Izembek and Moffet Lagoons. Moderately high concentrations of waterfowl can be found in Izembek Lagoon in winter when open water is adequate (Map 5). Moderate winter concentrations can be found in portions of the Refuge outside Izembek Lagoon, in the waters of Bristol Bay and on the Pacific side in Morzhovoi Bay and Kinzarof Lagoon.

The most common waterfowl species are the cackling goose, emperor goose, black brant, northern pintail, mallards, green-winged teal, wigeon (American and Eurasian), and greater scaup (Taylor and Sowl 2008). Many of these species, including mallards, greater scaup, and black scoter nest within the NWR. The ducks spend their time foraging on invertebrates, sedge seeds, and eelgrass found within the lagoons.

Izembek SGR also supports many sea ducks that winter along the coastal waters, including common goldeneyes, harlequin ducks, long-tailed ducks, common and red-breasted mergansers, common eiders, Steller's eiders, black and white-winged scoters, and bufflehead (Table 6). The marine invertebrates of these coastal waters are an important food source for the wintering sea ducks.

Waterfowl that migrate through the refuge in fall are important to hunters from local communities, other parts of Alaska, the United States, and foreign countries. Cold Bay is well known as one of the best destinations for goose hunting in Alaska because of the staging brant and Canada geese that concentrate on the lagoons. Local residents hunt ducks and geese in Izembek Lagoon and on numerous freshwater lakes from September into December. Nonresident hunters visit mostly from late September through October when geese are abundant. Waterfowl hunters' access hunting sites from the road system or by small boats launched from Grant Point; most hunting occurs between Blaine Point and Applegate Cove. Some of the most common waterfowl species harvested include the cackling goose, brant, and northern pintail.

## **Brant**

During spring and fall staging periods, Izembek Lagoon is home to almost the entire Pacific Flyway population of brant (Table A2). They stop to rest and fatten up on the eelgrass beds before continuing their migration. Each April, the first migrants arrive from the south to replenish nutrient reserves that will be needed for egg laying. By mid-May most of the brant have departed for their northerly breeding grounds, mostly on the Yukon-Kuskokwim (Y-K) Delta, but also in Alaska's North Slope, northwest Canada, and Russia (Derksen and Ward 1993). In fall, brant begin arriving in late August and numbers increase through September. In late October or early November, they depart en masse when conditions favor migration with most flying directly to California and Mexico (Dau 1992).

Historically, a small contingent of brant (usually < 10,000) remained to winter on Izembek Lagoon, which is shallow but will often freeze. When displaced, these brant use Kinzarof Lagoon, Hook Bay, Bechevin Bay, and other open areas on the Pacific side of the peninsula. Since 2001, the number of brant wintering on or near Izembek SGR has averaged nearly 20,000, with a peak in 2007 of 40,000—nearly 30% of all Pacific brant (Trost and Sanders 2008).

Two populations of brant comprise the Pacific Flyway population and use Izembek SGR, the Pacific black brant and the Western High Arctic (WHA) or grey-bellied brant (Pacific Flyway Council 2002). The black brant, which make up most of the Pacific population, have numbered about 110-150,000 (Trost and Sanders 2008); they breed mostly in five major colonies on the Y-K Delta. Their wintering grounds include coastal bays from British Columbia to California, but are primarily the large bays on outer Baja peninsula of Mexico. Their year-round distribution is linked with the location of their primary food, eelgrass beds (Kramer 1976; Ward 1983; Derksen and Ward 1993; Moore et al. 2004). Brant in Izembek Lagoon predominantly feed on short narrow-leaved eelgrass plants. These eelgrass plants typically grow in areas closer to shore, occurring in dense stands in the shallow water eelgrass beds of tide pools. In addition to having a higher carbohydrate content, the smaller leaved plants are located in shallow water where they are available for foraging by waterfowl during a longer portion of the tide cycle than the larger leaved plants which are located in deeper water (Ward and Strein 1989).

The WHA population of grey-bellied brant is one of the smallest populations of Arctic nesting geese, recently estimated at less than 10,000 birds. This brant breeds on the high arctic islands in northwest Canada (Boyd and Maltby 1979), and winters in the Georgia Strait region of British Columbia and Puget Sound, Washington (Reed et al. 1989a; Pacific Flyway Council 2002). Although their fall staging periods overlap, the grey-bellied brant is found primarily in Moffet Lagoon and the northern part of Izembek Lagoon (Reed et al. 1989b), while the black brant is found throughout the lagoon.

Brant are an important resource for subsistence hunters from northwest Canada to western Alaska; traditional spring and summer hunting contributes the largest proportion of Pacific brant harvest. Recreational hunting, often by a small contingent of specialized hunters, occurs in Alaska mostly at Izembek Lagoon, in southern British Columbia, Puget Sound in Washington, major bays in California, and in Baja Mexico. Sport harvest regulations have been conservative for many years and are designed to retain brant on all key wintering areas along the Pacific Coast (Pacific Flyway Council 2002).

## **Emperor Goose**

The emperor goose is strongly dependent on marine habitats, breeding mainly in coastal areas of the Y-K Delta, and also in smaller numbers on St. Lawrence Island and in northeast Russia (Pacific Flyway Council 2006a). They winter along the Alaska Peninsula and the Aleutian Islands, foraging on eelgrass, algae, mussels, and invertebrates in the lagoons and crowberries (*Empetrum nigrum*) in the uplands. Each spring and fall, essentially the entire world population of emperor geese stages in or passes through Izembek SGR and Izembek NWR on their migrations. During the winter, several thousand emperor geese remain in the lagoons where ice conditions allow (Taylor and Sowl 2008).

The emperor goose population was probably about 150,000 in the mid-1960s, based on a single comprehensive survey in 1964. By 1981 when regular spring aerial surveys were begun, the population was about 100,000 and it declined to about 50,000 in the late 1980s. In 1986, the hunting season was closed, the Y-K Delta Goose Management Plan called for cessation of subsistence hunting, and conservation programs and research were intensified. Predation on the breeding grounds, low winter survival of juvenile birds, and continued harvest have prevented restoration. Since 1986, the population has fluctuated between 50,000 and 80,000, but has not

shown a consistent improvement. Although Izembek Lagoon was a popular emperor goose hunting area, the season remains closed.

### **Cackling, Aleutian and Taverner's Geese**

Each fall more than 50,000 "Canada" geese gather at Izembek and Moffet Lagoons (Table A4), roosting and feeding on eelgrass in the lagoon and foraging in the surrounding uplands for crowberries. Recently, genetic analysis prompted reclassification of the small Aleutian, cackling, and Taverner's subspecies in a new species *Branta hutchinsii* under the English name "cackling goose", while retaining the name Canada goose, *B. canadensis* for larger subspecies to the east (AOU 2004).

Historically, most white-cheeked geese at Izembek Lagoon during fall are Taverner's geese. Fall aerial surveys have provided the only informal index of this population. Cackling geese (*B. h. minima*) have been increasing in proportion during fall (Taylor and Sowl 2008) since the population weathered serious declines that prompted a flyway-wide hunting closure in 1984. These cacklers rebounded and expanded their range by the early 1990s, and hunting was reopened in 1994 (Pacific Flyway Council 1999).

Spring observations of cackling geese are rare on the adjoining state and federal refuges because the Taverner's and cackling use a different route during spring migration (Taylor and Sowl 2008). Springtime goose sightings are most likely to be Aleutian cackling geese (*B. h. leucopareia*). Formerly endangered because of fox introductions to their breeding islands, Aleutian geese increased rapidly in the 1990s and were removed from the federal threatened species list in 2001. The population continues to grow and now numbers over 100,000 birds (Pacific Flyway Council 2006b).

Cackling geese are an important species for subsistence hunters in western Alaska and other hunters within the State Game Refuge. Izembek SGR has always been one of the most productive goose hunting venues in Alaska. Taverner's and cackling geese are also an important component of the goose harvest in Washington and Oregon.

### **Tundra Swan**

Tundra swans on the Izembek refuges are unique. Although they are part of the Western Population (WP) of tundra swans (Pacific Flyway Council 2001), the 200-250 swans using the Izembek area and Unimak Island are mostly non-migratory (Dau and Sarvis 2002). Except for occasional emigration by a few swans and a few years when larger emigrations occurred, these swans remain in the Izembek area year round. In contrast, 300-600 tundra swans that breed 40 miles to the east, beyond Cape Lieskof and Pavlof Bay, undergo a traditional migration to winter in California and as far as Mexico.

Aerial surveys conducted during September and October have found 25-75 swans using Moffet Lagoon. Swans that remain in the region winter mainly on Unimak Island. Spring concentrations of tundra swans have been observed between Norma Bay and Applegate Cove. Swans are generally seen near the mouths of streams, in areas of low salinity<sup>1</sup> (Map 5).

Tundra swans in the Izembek refuges and on Unimak Island warrant special management because of their unique non-migratory behavior and low numbers. After major emigration

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<sup>1</sup> Kristine M. Sowl, Wildlife Biologist, U.S. Fish and Wildlife Service, Izembek NWR. Personal communication regarding birds, March 2009.

events during 1988-90, breeding swans in the Izembek area declined slightly from about 230 in the 1980s to 215 through 1996; since 1999 less than 100 swans have been recorded on breeding surveys and the estimated number of pairs has been about 26 (Dau and Sarvis 2002; Taylor and Sowl 2008; Table 3). In addition, Izembek swan productivity has been low in comparison to the Pavlof area to the east and other breeding grounds in Alaska. The average number of nests near Izembek declined from 40 to 23 in the 1990s and is now less than 10 (Table 3). Dau and Sarvis (2002) concluded that periodic emigrations can have significant impacts on nesting effort and clutch size of Izembek swans.

The unique character and low numbers of tundra swans near Izembek refuges and Unimak Island have precluded swan hunting seasons that are open in other parts of Alaska and the Pacific Flyway (Pacific Flyway Council 2001); swan hunting also is closed here under federal spring and summer migratory bird subsistence regulations (50 CFR 92).

### **Steller's Eider**

The Steller's eider is the smallest of the eider ducks, measuring about 18 inches in length and weighing about two pounds. They are sea ducks that dive for mussels and other invertebrates in marine waters during most of the year, but feed on insect larvae in freshwater ponds during the breeding season. The Steller's eider is the least abundant eider in Alaska, though they were formerly more common in some areas of Alaska. The Steller's eider is an Alaska Species of Special Concern and that portion of the Pacific population breeding in Alaska was federally listed as threatened under the Endangered Species Act in 1997 (USFWS 2002). In Alaska, the breeding population may number as few as 1,000 individuals, mostly in the vicinity of Barrow (Quakenbush et al. 2004). Specific causes of decline in Alaska are not known, but may include poor productivity from predation, lead poisoning, and an unknown level of subsistence harvest (Flint and Herzog 1999).

The current world population is estimated at 150,000 to 200,000 birds, but the population is thought to have declined since the 1980s. Pre-migration spring aerial surveys along the Alaska Peninsula recorded 137,000 Steller's eiders in 1992, with lower counts through the most recent estimate of 87,400 in 2007 (Larned 2007). Their primary breeding range includes the central and northeast coast of Russia, and the western Arctic Coastal Plain of Alaska (particularly near Barrow), where they nest on the tundra near small ponds. Steller's eiders are now rarely found along the western Alaska coast during the breeding season.

Most of the world population of Steller's eiders crosses the Bering Sea from nesting grounds in the arctic to molt in Izembek and Nelson Lagoons (Petersen 1981; Dau et al. 2000). Starting in late July and peaking in late August, about 20,000 – 40,000 Steller's eiders arrive from northern Russia and Alaska to molt in Izembek and Moffet Lagoon (Taylor and Sowl 2008) (Map 6). The highest concentration of molting occurs in Norma Bay, Applegate Cove, the northern section of Izembek Lagoon, and the southern section of Moffet Lagoon. These areas are characterized by deep channels adjacent to shallow areas with extensive eelgrass beds (USFWS 1998). When the eiders molt, they simultaneously lose their flight feathers and so are flightless for about three weeks during September and October. In the lagoons, the Steller's eiders rely heavily on crustaceans, mollusks, and other marine invertebrates that occur in the eelgrass beds.

After molting, the Steller's eiders winter in shallow, nearshore marine waters along the western Alaska Peninsula (such as Izembek Lagoon, Kinzarof Lagoon, and Hook Bay) and throughout the eastern Aleutian Islands (USFWS 2002). In the spring, tens of thousands of these eiders

gather at Izembek Lagoon to replenish nutrient reserves before moving on to their northern staging and breeding areas.

A portion of the Izembek SGR is designated by the federal government as Steller's eider critical habitat (USFWS 2001). The designated area covers 140 square miles and includes 186 miles of shoreline, as well as waters of Izembek Lagoon, Moffet Lagoon, Applegate Cove, Norma Bay, and water 1/4 mile offshore of Kudiakof Islands and adjacent mainland. The critical habitat is defined as nearshore waters less than 9 meters deep. Steller's eider use this designated area for spring staging, molting, and wintering in concentrations of 5,000 – 10,000 birds. The designated area is used by both the unlisted birds from Russia and the threatened Alaska-breeding Steller's eiders.

Izembek Lagoon is an important site for Steller's eider research, focusing on vital aspects of their ecology during molt and winter, surveys to document annual distribution, and banding and recapture to estimate survival rates. Other research has focused on aspects of reproduction, mortality, migration, and behavior (Flint et al. 2000).

## **SEABIRDS**

The most common seabirds that breed on or adjacent to Izembek SGR include cormorants (double-crested, red-faced and pelagic), common murres, tufted and horned puffins, pigeon guillemots, black-legged kittiwakes, and glaucous-winged gulls. Arctic and Aleutian terns have also been seen nesting at Izembek Lagoon, but little is documented on their abundance and distribution. Although most breeding colonies occur on offshore islands (such as Amak Island) or mainland cliffs, two known seabird colonies, of about 1,000 birds, are located within Izembek Lagoon (Map 5). Most species nest on sand flats or barrier islands where their most common predators are red foxes, brown bears, ravens, and glaucous-winged gulls.

During winter, seabirds, such as pigeon guillemots, common murres, cormorants, murrelets and auklets, may be present in waters offshore or in nearshore waters of Izembek SGR in years that sea ice from the Bering Sea extends further south (Taylor and Sowl 2008). Some of these are occasionally observed in nearshore waters in the winter. Seabirds such as shearwaters and storm petrels are occasionally blown onshore during fall storms.

The Kittlitz's murrelet, a small diving bird, occurs in the nearshore waters of Alaska with smaller numbers off the coast of Russia. It has been sighted in Izembek Lagoon, and between September 1991 and July 1992 there were 4 observed near the Cold Bay dock and 3 observed offshore of the town. A juvenile was observed near the Cold Bay dock in October of 2008 (Kristine Sowl, pers. comm. 2009). There has also been one nest discovered in the Izembek area near Frosty peak, south of Applegate Cove (Bailey 1973; Map 7).

Major seabird die-offs attributed to climatic effects occasionally occur in the Gulf of Alaska (El Niño of 1997-98; Mendenhall et al. 1998) and in Bristol Bay (severe weather event in 1970; Bailey and Davenport 1972). Izembek NWR staff periodically conducts beached bird surveys to help detect and monitor seabird die-offs.

## **SHOREBIRDS**

The unvegetated mud and sand flats and sandy beaches that dominate the coastal lagoons of Izembek SGR provide ideal shorebird foraging habitat, particularly in the northeast portion of Izembek and Moffet Lagoon. Over 30 species of shorebirds have been observed. While most are

migrants, six species occur as local breeders: semipalmated plover, least sandpiper, rock sandpiper, dunlin, short-billed dowitcher and Wilson's snipe (Table 5). Most of these breeders nest in vegetated wetlands except for semipalmated plovers which nest on gravel surfaces and rock sandpipers whose nests can be found in upland areas such as dry meadows and tundra. Two species (sanderling and rock sandpiper) overwinter, as well as breed, in the Izembek area. The wintering areas of the other locally breeding shorebird species are found in four isolated areas along the Kudiakof Islands, the western side of Izembek Lagoon (Map 6). In fall 1993, there was estimated to be between 78,000 and 285,000 birds using Izembek Lagoon (Tibbitts et al., 1996). Rock sandpipers were the most abundant followed by dunlins and western sandpipers. They accounted for more than 95% of all shorebirds recorded (Tibbitts et al. 1996). Izembek Lagoon is one of the last high quality foraging habitats available before shorebirds depart to transoceanic flights to wintering areas on the Pacific Coast or southern Pacific Islands (Tibbitts et al. 1996).

## **RAPTORS**

Bald eagles, golden eagles, gyrfalcons, rough-legged hawks, Peale's peregrine falcons, merlins, northern harriers, short-eared owls, and snowy owls can all be found in the vicinity of Izembek SGR (Taylor and Sowl 2008). Gyrfalcons are year-round residents, while rough-legged hawks and short-eared owls are a migratory species that breed on the NWR. Eagles (and other large raptors) feed on staging waterfowl as well as salmon and beach carcasses. Bald eagles are the most common raptor that uses the lagoon and adjacent uplands year-round. They can nest on cliffs, sea stacks, large inland boulders, small islands in freshwater ponds, large sand dunes, and on man-made structures (Taylor and Sowl 2008) (Map 5). Three known bald eagle nests are along the Kudiakof Islands west of Izembek Lagoon.

## **OTHER LAND BIRDS**

Over 30 other species of bird life are known to have occurred on the SGR and adjacent INWR (Table 6). While these species predominantly inhabit upland habitats many of them transit through or carry out foraging for food, nest materials and grit within the shorelands and tidelands of the Izembek SGR. Willow and rock ptarmigan and at least 17 other species of upland birds breed on Izembek NWR. Common breeders in the area include those that nest on the tundra (Lapland longspurs, American pipits, savannah sparrows) and those that nest in shrub habitat (golden-crowned sparrows, yellow warblers, fox sparrows, common redpoll). Less common breeders include Wilson's warbler, bank and tree swallows, hermit thrush, pine grosbeak, and several resident species. Year-round residents include common raven, black-billed magpie, northern shrike, American dipper, snow bunting, gray-crowned rosy finch, common redpoll, and ptarmigan. Ptarmigan are an important sport hunting species for both local and non-resident hunters. Flocks of snow buntings and gray-crowned rosy finches are frequently observed in winter. McKay's buntings occasionally occur within the winter flocks of snow buntings.

## **MAMMALS**

### **MARINE MAMMALS**

The marine waters adjacent to and within Izembek SGR are inhabited by a number of marine mammals, including the sea otter, Steller sea lion, northern fur seal, walrus, harbor seals, gray whale, humpback whale, killer whale, minke whale, and harbor porpoise (Sowl and Taylor 2008). Baird's beaked whale and Stejneger's beaked whale are rarely found in nearshore waters



(Angliss and Outlaw 2003). Harbor seals and Steller sea lions inhabit nearby coastal waters and may haul out on sandy beaches, rocky coasts, or nearby islands. In an aerial survey done in 2000, observers found close to 1,000 harbor seals a day (8/21-8/27) in Izembek Lagoon (Withrow 2001). They also found about 23 harbor seal haul outs located within Izembek SGR (Map 8). Harbor seals are important for subsistence hunting by Southern Alaska Peninsula communities. The gray whale is known to traverse Unimak pass and occasionally is observed in the lagoon. Gray whales are common spring (April-June) and fall (November and December) migrants in near-shore waters (less than 1 km offshore) (Gill and Hall 1983). Occasionally gray whales, humpback whales, harbor porpoises, and killer whales will visit the coastal lagoons for searching for food or shelter (Taylor and Sowl 2008). Marine mammal carcasses frequently wash on shore and become an important food source for brown bears, foxes, bald eagles, gulls, ravens, and other scavengers.

The humpback whale and Steller sea lion are listed under the federal ESA as Endangered or Threatened species. The State of Alaska listing of Endangered species includes the humpback whale.

## **Sea Otters**

Sea otters commonly forage for bottom-dwelling marine invertebrates in shallow waters. The helmet crab, which is abundant in Izembek Lagoon, is an important food source for otters in that area. Uncommon to most sea otters, the Bering Sea population has a home range of up to 30 miles offshore. The shallow waters of the Bering Sea continental shelf allow the otters to be more pelagic and mobile (Taylor and Sowl 2008). The USFWS collects sea otter observations while doing aerial waterfowl surveys of Izembek Lagoon; these data are available in Table 11. Three sea otter haulouts are found within Izembek SGR; each occurs at openings between the barrier islands connecting the Izembek Lagoon with the Bering Sea (Map 8). Recent evidence suggests that sea otters are concentrating in more sheltered lagoons and bays (Taylor and Sowl 2008).

Sea otters can tolerate severe ice and weather conditions during the winter if they have access to open water to forage. Their extremely dense fur provides excellent insulation against the cold waters. Sometimes the otters haul out on shore ice, ice floes, or barrier islands of the lagoon. In extreme cold weather, rapid ice formation may prevent sea otters from accessing the open water for foraging, resulting in substantial mortality (Taylor and Sowl 2008).

The Southwest Alaska distinct population segment of northern sea otters (*Enhydra lutris kenyoni*) is listed as a threatened species under the ESA. The USFWS is currently considering designating near-shore waters as critical habitat for this species. This designation, as proposed December 16, 2008 (50 CFR Part 17 Vol. 73, No.242), would include Izembek and Moffet Lagoons, and the waters around Amak Island.

## **TERRESTRIAL MAMMALS**

### **Brown Bears**

Brown bears are widespread throughout the Alaska Peninsula. The Joshua Green River watershed on the eastern end of Izembek Lagoon supports high densities of bears and is considered to be the most important habitat for brown bears year-round on the SGR and Izembek NWR. Other concentration areas include the streams along the southern shore of Izembek Lagoon between Applegate Cove and Frosty Peak. Denning areas include Frosty Peak and the

hills and mountains surrounding the Joshua Green River watershed, including the Right and Left Hand Valleys (Map 9). Due to a combination of high quality habitat, abundant food, and low levels of human disturbance as bears in the Joshua Green River watershed area have relatively small home ranges (4-7 mi<sup>2</sup>) compared to bears using other areas of the Alaska Peninsula (97 mi<sup>2</sup>). Bears produced in these areas frequently roam Izembek Lagoon and the isthmus between Izembek and Cold Bay in their search for food. These bears use a wide variety of habitats, including tide and submerged lands, shorelands, lowland meadows and tundra, streams, midland tall shrub, and alpine zones (Glen and Miller 1980; Dau 1990; Taylor and Sowl 2008).

During spring and early summer, bears are generally widely dispersed, looking for opportunistic food sources such as beached marine mammal carcasses, caribou and moose calves, ground squirrels, or newly sprouted sedges. Bears use the coastal grass flats, feeding on early growing herbaceous plants such as sedges. The same grass flats are used year after year, and provide a reliable, high quality food source during spring when bears are generally in their poorest condition. Consequently, these grass flats are considered to be important brown bear habitat. Foraging for carrion, marine mammal carcasses, and clams along the tide and shorelands of Izembek SGR also provide important spring food sources. Bears concentrate along salmon spawning streams as the summer progresses through fall. Similar to spring feeding areas, these river stretches constitute important bear habitat. During much of the year, bear may be seen wading and swimming in Izembek Lagoon as they forage and travel between the mainland and the barrier islands. By mid-November, many bears have moved to their den sites in upland areas.

Due to the area's importance to brown bear, the Izembek NWR cooperated with ADF&G to establish the Joshua Green River area as a Controlled Use Area in 1993. This area is closed to the use of any motorized vehicle, except for outboard motor-powered boats for the purposes of sport hunting.

## **Caribou**

The Izembek SGR is located at the southern extent of the range of the Southern Alaska Peninsula Caribou Herd (SAPCH). Historically, the size of the SAPCH has varied widely, ranging from 500 to more than 10,000. Following population declines from 10,000 animals in 1983 to below 2,500 in 1993; from 1996 the herd went through a period of growth peaking at 4200 in 2002 and has been in decline from 2002 to 2008 (Squibb 2003; Butler 2007). The SAPCH primarily occupies calving grounds to the northeast of the SGR in the Caribou River flats and Black Hills/Trader Mountain areas (Butler 2007). However, wintering areas extend southward encompassing the area around Izembek Lagoon, Cold Bay and the refuge. SAPCH calving and wintering areas are depicted in Map 8. The annual movements of SAPCH tend to be 50 miles or less. The narrow isthmus between Cold Bay and Moffet Lagoon is an important movement corridor between the southern extent of wintering areas and the calving grounds, as well as being a wintering area. While caribou use a variety of habitats, arctic and alpine tundra and wet sedge areas are of particular importance. Caribou have also been observed using the frozen or dewatered tide and submerged lands of the Izembek SGR. In spring the SAPCH begins moving northeastward through the SGR area towards the calving grounds with calving peaking during the first two weeks of June.

Caribou are an important subsistence resource, providing considerable amounts of protein for residents of Cold Bay, King Cove, and False Pass (Fall et al. 1993, 1996).

## **Moose**

Moose primarily occur on the northern part of the Alaska Peninsula; their range extends as far south as Pavlof Bay. Within the Izembek SGR area the Joshua Green River watershed is home to a few resident moose.

## **Furbearers**

The Izembek SGR is home to a number of furbearing species including coyote, gray wolf, mink, red fox, river otter, weasels and wolverine (Table 7). While these species primarily inhabit upland areas, most make extensive use of the beaches, tide and submerged lands by foraging for carrion, small mammals and waterfowl. Weasels, red fox, mink, coyote and gray wolf are known to use the coastal tideland areas and water bodies searching for small mammals, carrion or other prey. Red foxes are abundant and seen year-round along beaches, the tundra, and in the adjacent uplands. River otters are seen in coastal lagoons and on beaches, and in the freshwater streams and lakes of the adjacent watersheds. Wolves occur throughout the Alaska Peninsula and Izembek SGR in low to moderate densities (Butler 2006). They feed on carrion, caribou, moose, and small game.

## **Small Mammals**

Though the list of small mammal species using the state game refuge is incomplete, small mammals known to use the Izembek area include porcupine, tundra hare, arctic ground squirrel, masked shrew, dusky shrew, northern red-backed vole, tundra (root) vole, brown lemming, Greenland collared lemming, and meadow jumping mouse (Table 7). These species are known to search for food on the tidelands of the SGR.

Brown (1996) observed that shrews were the most common and widespread small mammals, were found in the majority of habitat types, and usually in the greatest numbers in coastal areas. The highest concentrations of masked and dusky shrews were found near intertidal areas; the dominant species on the barrier islands of Izembek Lagoon were Tundra voles. These species forage within the tidelands, which provide a renewable source of marine invertebrates and other prey with each tide cycle. Arctic ground squirrels are widely distributed in tundra uplands and provide an important food resource for denning foxes, nesting eagles, post-denning brown bears, and other wildlife species.

## **FINFISH**

The finfish resources of the Izembek SGR, adjacent state waters, and nearby federal waters are abundant and diverse. Primary resident and anadromous fish species include Arctic char, Dolly Varden, pink salmon, sockeye salmon, coho salmon, and chum salmon, threespine stickleback, and, in much smaller numbers, steelhead (rainbow trout) and Chinook salmon. Others such as, Pacific sand lance, yellowfin sole, sculpin, green turbot, and Pacific cod have been found in marine waters outside of Izembek Lagoon (Map 9).

Conservation of the lagoons and intertidal areas is especially important to the survival of salmon. Each year hundreds of thousands of salmon begin and end their life cycles within the Izembek SGR area. Sixteen documented anadromous fish streams drain into Izembek Lagoon (Map 5). All of these support chum salmon runs; although the Joshua Green River accounts for about half

of the production in the Izembek Moffet Area<sup>2</sup>. The Joshua Green, Moffet, Moffet Springs, Frosty, Blue Bill, and Red Salmon systems are the largest. Of these, Joshua Green and Frosty support all five Pacific salmon species, although the Chinook salmon runs are extremely small, and only observed sporadically. The majority of the streams support coho; streams draining lakes also support sockeye salmon runs. Joshua Green, Blue Bill, and Outer Marker Lake are the most productive of these stream systems. Returns in this area peak from July to September depending on the individual species and drainage (Dion 2006; Whitton and Eaton 2001; and Cornum et al. 2004).

ADF&G has conducted aerial surveys to estimate the number of spawning salmon, by species, in 14 different streams that enter Izembek Lagoon. Because of the limitations of this type of observation, only chum, coho, and sockeye salmon are abundant enough to be consistently detected for estimation purposes. Due to budgetary constraints, surveys are often not conducted in the late fall, when coho salmon are present. Table 9 depicts the 2007 salmon escapement estimates for the entire lagoon based on aerial survey data.

Based on historical documents and survey reports (Dion 2006; Adams et al. 1993), it appears that Lamprey Lake/ VOR Lake/Lamprey Creek system and the Hess Lakes/Trelford Lake/Red Salmon Creek system refer to the same water bodies. These are identified in the *Catalog of Waters Important to the Spawning, Rearing and Migration of Anadromous Fish* (Johnson and Daigneault 2008) as Stream No. 312-20-0010 and Stream No. 312-20-0020.

In addition to human harvest (described later in this inventory), salmon are important as a direct or indirect food source for a variety of wildlife species. Adult salmon provide food for brown bears, bald eagles, and other predators and scavengers, while salmon fry are important prey for fish, birds, and small mammals. Late fall runs of coho salmon are especially important to wildlife as these fish are one of the last available food sources prior to winter. Salmon carcasses also provide food for scavengers and decomposers, and the nutrients released from the decaying carcasses of spawned-out salmon recharge the freshwater ecosystems and boost productivity of these and nearby terrestrial ecosystems (Taylor and Sowl 2008). Vast numbers of migratory waterfowl forage on the invertebrates or aquatic plants of these nutrient-enriched systems.

A variety of marine fish species occur in the coastal waters within the lagoon and outside the barrier islands of Izembek SGR. The eelgrass beds within Izembek Lagoon (Map 4) support an abundant summer fish fauna consisting mainly of small demersal and benthic species (McConnaughey 1977). The eelgrass beds are important habitat for juvenile fish, because they provide abundant foods, favorable current and temperature conditions, and shelter from predators. Large fish forage along the edges and above the canopy of the eelgrass. Based on biomass estimates of the standing stock, eelgrass is by far the most productive habitat type in the lagoon, the next most productive is the channel areas, and then the sand flats. However each habitat type supports a distinctively different fish community (Tack 1970). Juvenile flatfish prefer areas with fine grained substrate for nursery areas (Moles and Norcross 1995). The nearshore shallow, protected marine waters with fine grained sediments make Izembek SGR attractive to juvenile forage fish as well, especially rainbow smelt and Pacific sand lance. During the winter, the lagoons and coves may freeze. Fishes that are tolerant of lower salinities,

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<sup>2</sup> Steven Schrof, Fishery Biologist, Division of Commercial Fisheries, Alaska Department of Fish and Game, Kodiak. Personal Communication, 2006.

such as sticklebacks, move into deeper freshwater streams and rivers, while other species, such as some sculpins, will migrate into deeper water offshore (Paulson and Smith 1978).

A recent review of literature available for the Alaska Peninsula Bristol Bay Area concluded that there is a lack of distribution and abundance information for nearshore fish species and for marine fish in lagoon habitat (Argonne National Laboratory 2007). Historic studies (1964-1972) specific to the Izembek Lagoon area collected a total of 39 species (demersal, pelagic, and benthic) in the lagoon (Tack 1970; McRoy 1966; Smith and Paulson 1977). No sampling has been done November through April, and the majority of the survey effort during these studies was concentrated in July and August; there is currently no information available on overwinter fish use of the lagoon. An inventory of fish using inshore habitats of the northern Alaska Peninsula was conducted 1984-85 and included a transect with stations both inside Moffet Lagoon and beyond Neumann Island. This survey observed ten additional species (Isakson et al. 1986). Overall, 59 finfish species have been documented in the waters of Izembek SGR (Table 8).

Six species commonly occurring in the lagoon area (steelhead, rainbow smelt, capelin, three spine stickleback, Pacific sand lance, and crescent gunnel) are currently listed as Featured Species in the State of Alaska's Comprehensive Wildlife Conservation Strategy (ADF&G 2006).

## **MARINE INVERTEBRATES**

Eelgrass leaves provide a base for the complex food web, providing food and shelter for a number of marine invertebrates. Inhabitants of eelgrass include herbivores, particle feeders, deposit feeders, sediment ingesters, and carnivores. Eelgrass carbon is ingested by a wide variety of amphipods, isopods, copepods, shrimps, crabs, clams, snails, polychaetes worms, and echinuroids. Eelgrass also forms an attachment substrate for a variety of organisms, including bacteria, diatoms, nematode worms, polychaete worms, oligochaete worms, hydroids, bryozoans, sponges, clams, snails, crabs, and barnacles. A list of marine invertebrates collected in Izembek Lagoon during the 1960s and 1970s by USFWS is presented in Table 14.

Many of these invertebrates are an important food resource for other invertebrates, fish, birds, and other wildlife species. The helmet crab is one of the most prominent invertebrates in Izembek Lagoon; McConnaughey (1977) estimated almost one helmet crab per square meter in the intertidal eelgrass beds. This crab forages on both eelgrass and invertebrates and is fed upon by sea stars, several species of fish, sea otters, red foxes, brown bears, common ravens, diving birds, waterfowl, sandpipers, and gulls. Juvenile king crab occur throughout Izembek Lagoon (Map 9), though eggs, juvenile, spawning and mature life stages occur in marine waters outside of the lagoon. Tanner crabs are also found in various life stages, mostly outside of the lagoon. Amphipods, which are a major prey species of fish, are quite abundant on eelgrass blades (Paulson and Smith 1978). Clams are utilized by brown bears and birds. Pacific Razor Clam concentrations occur along the barrier islands on the western side of Izembek Lagoon, as well as within the lagoon between Cape Glazenap and Grant Point.

Invertebrates using habitats at mouths of freshwater streams have not been studied.

## **AMPHIBIANS AND REPTILES**

Amphibians and reptiles are not known to occur in the Izembek State Game Refuge. However, the refuge lies within the range of the leatherback sea turtle (*Dermochelys coriacea*) (MacDonald

2003). This wide-ranging species typically forages in temperate waters, but non-breeding turtles seem to be more cold-tolerant and have been seen in higher latitudes. Between 1960 and 1998, at least 19 leatherback sea turtles were observed between Southeast Alaska and the Alaska Peninsula. Leatherback sea turtles are an ESA listed endangered species.

## **THREATENED AND ENDANGERED SPECIES**

The state Endangered Species Act (AS 16.20.190) establishes criteria for listing endangered species, but the act does not include “threatened” or other categories. Of the five species currently listed as state endangered species (Table 13), the short-tailed albatross (*Diomedea albatrus*) and humpback whale (*Megaptera novaeangliae*) could occur in the SGR.

## **SPECIES OF SPECIAL CONCERN**

In Alaska, sensitive species are administratively designated by the Commissioner as Species of Special Concern (SSC). A Species of Special Concern is any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance. Because the state Endangered Species Act does not have threatened or candidate categories, such species may be included on the SSC list.

Izembek SGR lies within the distribution of several Species of Special Concern (see Table 13), including the American peregrine falcon (*Falco peregrinus anatum*), Arctic peregrine falcon (*Falco peregrinus tundrius*), Harbor seal (*Phoca vitulina*), and Sea Otter (*Enhydra lutris*). Spectacled eider (*Somateria fischeri*), Steller's eider (*Polysticta stelleri*), the western stock of the Steller sea lion (*Eumetopias jubatus*), and Bowhead whale (*Balaena mysticetus*) are on the SSC list and are also federally listed as threatened or endangered. The Aleutian cackling goose (*Branta hutchinsii leucopareia*) is now recovered and abundant; it was delisted under the federal ESA in 2001 and will be removed from the state SSC list.

## **ARCHAEOLOGY AND HISTORY**

The Izembek area is rich in archaeological and historical resources. Many archaeological sites are known in the SGR area, and additional sites are in the Izembek NWR. A complete prehistoric archaeological survey of the SGR has not been completed, though the area is known to have been used by Aleuts for their subsistence harvest of marine mammals, waterfowl, and caribou (Wright 1999). Further, the area is believed to have been the location of trade fairs, with participants from surrounding islands and the mainland (McCartney 1973).

Lands within Izembek SGR were near the southern end of the Bering land bridge and probably played an important role in the migration of Asiatic peoples to North America. Early occupants of the southern Alaska Peninsula and eastern Aleutian Chain included Aleut and possibly Yup'ik Eskimos. Archaeological data shows that the first inhabitants arrived in the area about 6,000 years previously (Maschner et al. 1997). These people lived in a region with abundant marine mammals, salmon, waterfowl, and other food resources, which may have facilitated the transition from mobile hunter-gatherers to a more sedentary lifestyle. At the time of European contact, the region supported some of the most politically complex and sedentary hunter-gatherers known to anthropology (Maschner et al. 1997). As a consequence of long occupation, many archaeological sites exist particularly along the coastlines and lagoons. These sites are

significant for information they contain or the associations they have with past people, events, or ways of life. Some cultural resources or sites exist from the historic period, most associated with the military occupation of the area during World War II.

The first historical record of the lagoons is from 1827, when the Russian captain and Count Feodor Petrovich Lutke gave the name “Izenbeck” for Karl Izembek, the surgeon aboard the Russian sloop “Moller” (WR BSFW 1969; Orth 1971). Moffet Point, at the north end of Moffet Lagoon, was named by W. H. Dall of the USC&GS in 1882, for Midshipman Samuel Moffet, a fourth member of Lutke’s party (WR BSFW 1969). Moffet Lagoon has also been known as “Neumann and Sloss Bays” and “Moffet Cove” (Orth 1971).

Cape Glazenap was also named by Lutke, presumably after two midshipmen in his party (WR BSFW 1969). Lutke assigned the name Krenitzin to the cape at the northwest end of Alaska Peninsula, presumably after explorer Peter Krenitzin (WR BSFW 1969).

The Kudiakof Islands, including Glen, Operl, and Newmann Islands, form the northwest boundary of Izembek and Moffet lagoons. Lutke published the name Khoudiakoff, in honor of the surveyor Kudiakov who was sent to the area by Lt. Sarichev in 1791. The islands were called “O[strova] Chimyudy” or “Chimyudy Islands” by Captain Tebenkov in 1852. Orth (1971) speculates this Aleut name may be derived from the words “cimgup” and “uddag” which together mean “small saltwater fish” and “bay.”

The remains of a 1902 schooner, *Courtney Ford*, lie in a shallow area of Izembek SGR (Map 1).

During WWII, the U.S. military established camp at Cold Bay that was eventually staffed by 40,000 soldiers. Construction of the military-related facilities began in 1941, and by 1942, the Cold Bay area supported military aircraft, communications equipment, and other facilities. As the United States’ participation in the war increased, the facilities at Cold Bay supported U.S. military activity along the Aleutian Chain by providing communications, maintenance of radar sites, and transportation of personnel and material (Wright 1999). The principal feature of the military facilities was an airstrip, which, though management has changed over the years, continues to be used, maintained, and improved.

In 1944, the base and airfield were placed in caretaker status. The name of the military base changed from Fort Randall Army Base to Thornbrough Air Force Base in 1947, after the U.S. Air Force assumed responsibility for the facilities. At this same time, a U.S. Fish and Wildlife Service office was opened. The military facilities were abandoned in 1950.

A Coastal Defense site was established at Grant Point in 1942 (Jacobs Engineering 2005). The U.S. Air Force moved to Grant Point in the 1950’s, and by 1958 had completed a Distant Early Warning Station (Wright 1999).

The FAA established facilities at Outer Marker Road in 1958. The remainder of the military land was transferred to FAA and BLM in 1961 (Public Land Order 2451).

After statehood, the Alaska Department of Fish and Game began to share management responsibilities with the U.S. Fish and Wildlife Service. The Izembek NWR was established in 1960 and the Izembek State Game Refuge in 1972.

During the Vietnam War, the FAA and the National Weather Service increased their facilities and number of personnel in the Cold Bay area. The airport and related facilities provided a refueling stop for aircraft flying the supply route to Southeast Asia.

The Alaska Historic Preservation Act (AS 41.35) preserves and protects the historic, prehistoric and archaeological resources of Alaska from loss, desecration and destruction. The investigation, excavation, gathering or removal from the natural state, of any historic, prehistoric or archaeological resources requires authorization from the Department of Natural Resources and also requires a Special Area Permit.

## **CONTEMPORARY HUMAN USE**

Human use of Izembek SGR is not as intensive as that of state special areas in urban settings. Approximately 200 people visit the refuge each year; waterfowl hunters comprise roughly 50% of the visitors. Other use activities include birding, wildlife photography, beachcombing, kayaking, and wildlife research. The remote setting and a variety of abundant, easily approached wildlife contribute to a high value wildlife watching or hunting experience.

Residents of Nelson Lagoon, Cold Bay, King Cove, Sand Point, and False Pass participate in hunting and fishing activities in Izembek SGR (Maps 10, 11, 12 and 13). The scale and intensity of these harvests is largely unknown. The Izembek/Cold Bay area is well-known as one of Alaska's best goose hunting spots—especially for brant. Combined with opportunities to hunt ducks and ptarmigan, and late salmon fishing, waterfowling on the refuge attracts numerous visitors from across Alaska and from other states. The number of visiting hunters has declined from the 1970s and 1980s when group excursions were organized, regulations were more liberal, and airfare was less expensive. Most hunters now are independent or use local guides. Limited recreational boating, including kayaking, occurs in the lagoon portion of the SGR. Beachcombing for recreation and profit also occurs.

Many of the common fish species in Izembek SGR are harvested by sport fishermen. Five species of Pacific salmon are commercially harvested offshore and in the lagoons. Commercial fisheries focus mainly on chum and sockeye salmon. Chinook are only incidentally captured in low numbers (one to two reported a year). Coho and sockeye salmon are the primary species harvested in subsistence fisheries (Murphy et al. 2008). Frosty Creek is used by sport and subsistence hunters to harvest Dolly Varden.

The long Cold Bay airstrip still provides support to aircraft flying to and from Southeast Asia, including occasional emergency landings which bring hundreds of wildlife viewers to a viewing hut at Grant Point. The viewing hut provides a panoramic view of the SGR, and includes permanent interpretive material and a telescope.

Past research and resource management projects have concentrated on the ecology of eelgrass and use of the area by migratory birds, bears, and caribou. Recent studies have included banding and marking of waterfowl for migration studies, research on feeding ecology and body condition of brant, mark-recapture analysis of Steller's eider survival, collecting samples for avian influenza studies, and documenting the presence and abundance of marine mammals.

## **INFRASTRUCTURE IN THE STATE GAME REFUGE**

Approximately 30 miles of roads currently exist in Izembek NWR, some of which are only seasonally useable. During World War II, a road was constructed from Cold Bay to Grant Point to facilitate "transport of coastal artillery to the unprotected Bering Sea coast" (Wright 1999). Grant Point Road now terminates at a small building for wildlife viewing. An interpretive display at the Grant Point viewing shelter, developed cooperatively with the USFWS Izembek



NWR, includes information about the SGR. A small unimproved boat launch is sited near the point, and an equipment storage facility used by the USFWS lies further along Grant Point Road. Outer Marker Road accesses FAA facilities; these facilities consist of an equipment building, a gravel pad and two towers with guys lines (Map 3).

Except for the unimproved boat launch at Grant Point, mooring buoys, and small structures to facilitate scientific research, no structures occur in Izembek Lagoon or have occurred in recent years.

No signs clearly identify the boundary of the SGR.

## **ACCESS TO IZEMBEK STATE GAME REFUGE**

Access to Izembek Lagoon is by boat from the Bering Sea, by aircraft to the outer beaches of the lagoon and at the mouth of Joshua Green River, by vehicle from Cold Bay, or by walking from the existing road and trail system on the adjacent uplands. Access by land is across federal lands in Izembek NWR.

The roads from the town of Cold Bay are maintained by the Alaska Department of Transportation and Public Facilities, the City of Cold Bay, the Federal Aviation Administration (FAA), or USFWS (Map 2). Grant Point Road provides vehicle access to the developed viewing site, the unimproved boat launch, and the central lagoon shoreline. Outer Marker road provides access farther north to the lagoon near Blaine Point. Frosty Creek is road accessible and is used for recreational (Dolly Varden) and subsistence fishing. Applegate Cove is accessed by trails from the Frosty Road or by boat. Waterfowl hunters and others access the Izembek SGR by walking trails that begin at the Izembek NWR road system. “All Terrain Vehicle” or “Off-Road Vehicle” (ORV) use in the SGR is restricted by Special Area Permit. ORV use is not allowed on vegetated areas.

Small, wheeled aircraft land in unvegetated areas at the mouth of the Joshua Green River to access the bear hunting area. Aircraft landings may also be allowed on the beaches on the seaward side of barrier islands and spits where the beach material can support the activity. A Special Area Permit is required to land an aircraft in the SGR. Landings are typically prohibited in Izembek Lagoon, Moffet Lagoon, and Strawberry Point. There are little or no floatplane landings in Izembek Lagoon, due to the hazards of shallow water and eelgrass beds. The FAA has established Class E controlled airspace 1,200 ft. above the surface of the Cold Bay Airport and surrounding area. In addition, FAA controls the airspace over the refuge; that agency requests pilots to maintain a minimum altitude of 2,000 feet over the Izembek NWR.

Boat traffic in the Bering Sea is generally allowed; motorized vessel use in Izembek Lagoon requires a Special Area Permit. Small research and recreational vessels can be launched at the unimproved launch near Grant Point. The boat launch ramp provides access for hand carried and trailered small boats. Hunters use small vessels to access hunting areas. In the coves and lagoons, boat traffic is limited by the shallow water and the presence of extensive eelgrass beds; however, as hand-held navigation equipment becomes more widely available, boaters can more easily navigate the deeper channels of the lagoon. Typically larger draft vessels are confined to the deep, unvegetated channels and shallow areas are avoided to reduce engine fouling. Studies in other coastal estuaries in the United States have documented damage to seagrasses as a result of motorized boat use. Propeller scarring or “prop scars” in eelgrass beds are caused by boat travel through areas that are shallower than the draft of the boat. The boat propellers can create

furrows in the aquatic vegetation and the substrate itself that are recognizable as long thin, light colored tracks. Within these furrows, the seagrass plants have been cut up or torn out of the sediment and in, some instances, the substrate has been blasted or dredged to form an unvegetated trough (Sargent et al. 1995; Kirsch et al. 2005). USFWS Izembek NWR staff has observed these scars in Izembek Lagoon but the extent and degree of damage to eelgrass beds within the Izembek SGR has not been quantified. Scarring may occur from accidental groundings, inexperienced navigation of channels and/or tidal stages, from shallow draft boats designed to move through vegetated areas, or from illegal use of ORVs in vegetated intertidal areas at low tide. An analysis of prop scarring in the Everglades National Park concluded that greater scar density occurs in areas that have shallower depths and in areas receiving heavy use by recreational boats (SFNRC 2008).

Personal watercraft, airboats, air-cushioned craft and other specialized conveyances previously have not been regulated.

Both Steller's eider and Pacific brant are susceptible to disturbance by motorized vehicles themselves. Brant foraging on eelgrass beds is influenced by tide stage; as the tide rises and deeper beds are inundated, they move inshore to reach shallower eelgrass beds. As the tide peaks; brant leave for other areas. Boat traffic is also typically limited by tide stage and water depth. At higher tide stages boats are able to access nearshore areas, outside of deeper channels. Consequently brant are feeding intensely in nearshore areas in the same time period that boats can access those areas; boat traffic prematurely displaces brant from feeding areas to roosting areas (Dau 1994). During the fall molting period, Steller's eiders congregate at Izembek Lagoon and are flightless. Displacement of flightless waterfowl to inferior foraging areas during an energetically stressed time could result in adverse impacts on survival rates (Dau 1994).

## **GUIDED HUNTING AND FISHING**

Limited options for lodging and transportation at Cold Bay have supported a few commercial hunting and fishing guides; some are local residents and some provide seasonal services. In the 1990s, many waterfowl guiding operations began offering regular shore and boat-based hunting.

## **COMMERCIAL FISHING**

### **HERRING**

The Izembek SGR is within the Amak District of the North Alaska Peninsula Herring Management Area. Commercial herring statistical areas 312-20 and 312-40 lie within the Izembek SGR, inside of the barrier islands. Commercial herring statistical areas 311-58 and 312-10 include the Bering Sea portion of the state game refuge (outside the barrier islands). Herring occur throughout the management area. Commercial openings and harvest in this district have been almost non-existent in recent years due to lack of industry interest (Jackson and Poetter 2006). Little harvest of Pacific herring occurs within the boundary of the SGR.

### **SALMON**

Izembek SGR lies within the Northwestern District of the North Alaska Peninsula Management Area (Area M) for commercial salmon fishing. Most salmon are harvested by seine gear although both drift and set gillnet gear are also legal gear types in the lagoon. In recent years, commercial harvest and effort in the lagoon has diminished due to low prices for salmon.

Because of this, the salmon resources are not being fully utilized by the commercial fishery (Table A10). A directed chum harvest occurred in the Izembek-Moffet Bay in 2006. The Izembek-Moffet Bay Section produces the majority of the chum harvested in the district. Most commercial harvest occurs mid-July to mid-August (Murphy et al. 2008).

## **LAND STATUS AND MANAGEMENT**

When Izembek National Wildlife Range was established in 1960, the boundary included Izembek Lagoon, inclusive of Applegate Cove and Moffet Lagoon, as well as the watersheds of these areas. The tidelands and submerged lands belong to the State of Alaska, and in 1972 the Alaska Legislature designated the land areas of the Izembek NWR and the tidelands, submerged lands, and the marine waters extending seaward of the barrier islands of Izembek Lagoon as Izembek SGR (Alaska Statute 16.20.030(a)14; 09/24/1972) (Map 2).

Map 2 shows the land status of Izembek SGR as of November 2008. The Legislatively designated boundary of Izembek SGR is shown in Map 1. AS 16.20.030 designates the boundaries of the SGR and incorporates all the land areas within the Izembek NWR. SGR jurisdiction within these boundaries includes state land and water, which is primarily the tide and submerged lands and navigable waters; SGR authority does not extend to federal land and water.

The State of Alaska manages Izembek SGR for the protection of fish and wildlife, their habitats, and public use of the area. Uses of state refuge lands are managed to prevent habitat changes that would be harmful to the wildlife or habitat, or degrade existing public use. The outstanding feature of the lagoons is the extensive eelgrass. Alteration of this natural state would represent an irreversible loss of a valuable Alaskan resource. Hunting, fishing, trapping, and recreational activities are encouraged so long as they are in keeping with the primary purposes for establishing the Refuge. Permitting decisions are made within the context of enabling legislation and other applicable statutes, regulations, and policies. Permitting decisions are also guided by the goals and policies of the management plan and with consideration of USFWS, Izembek NWR policies and goals.

Due to the geographical relationship between the State and National refuges, management is coordinated whenever possible. A Supplemental MOU between the USFWS and AFD&G was signed in 1986 (Appendix E).

The boundary of the City of Cold Bay, a second-class city, includes the Izembek SGR in the area of Grant Point (Miller 1982). The SGR lies entirely within the Aleutians East Borough, a second-class borough (Hoffman 1987). The boundaries of these jurisdictions are shown in Map 2.

The U.S. Air Force holds a 91.83-acre reservation (PLO 2374) for Distance Early Warning line radar site COB-M near Grant Point (Map 3). The FAA holds title to PLO 2451 and a right of way (ROW 44\_LD-513) for Outer Marker Road. The legal descriptions of these areas do not correspond to the location of the existing structures and features on the ground. The land status information shows the FAA managed lands are within the intertidal area, yet the facility is physically located on uplands. The BLM Master Title Plat, shows a third location for PLO 2451.

The state land status plats, except one, for the area that includes the SGR have not been created, so BLM MTPs are all that exist. When state status plats are created for this area, the SGR boundary and BBAP land classification order will be shown.

No Native allotment applications or patents, or private inholdings occur within the refuge. Several Native 14(h)(1) cemetery sites are located on the shores of Moffet Lagoon and Norma

Bay, and near Joshua Green River (Map 2). Further, no mining claims, oil and gas leases, or RS 2477 Rights-of-Way exist within the legislatively designated boundary. The King Cove Corporation owns approximately 15 squares miles of land along the eastern coast of Cold Bay, inside the boundary of the NWR.

## **RELATIONSHIP TO OTHER MANAGEMENT PLANS**

The April 2005 Bristol Bay Area Plan (BBAP) includes management objectives and guides DNR decision making in the Bristol Bay area, including the SGR. DNR would issue land use permits in Izembek SGR only after securing ADF&G concurrence.

The BBAP includes components that concern tidelands adjacent to federal refuges, which includes Applegate Cove, Izembek Lagoon, and Moffet Lagoon, as well as the intertidal area of the Bering Sea along the barrier islands. A “Tideland Resource Management Zone” features additional habitat protection requirements and specifications for uses of these tidelands.

The Aleutians East Borough was formed in 1987; the borough’s new Coastal District Plan went into effect October, 2008. Izembek Lagoon lies within the coastal zone and is identified as a Special Use area by the Aleutians East Borough Coastal District Plan for its waterfowl, fish, and harbor seal habitat value.

A portion of the Izembek SGR lies within the corporate limits of the City of Cold Bay, one of the newest communities in the borough.

Izembek NWR’s original Comprehensive Conservation Plan was completed on August 1, 1985. This plan provides management direction for the Izembek NWR. USFWS began the process to revise their plan in 2004 and held joint scoping meetings with ADF&G at that time (Appendix B).

Audubon Alaska has expressed an interest in working cooperatively with agencies and local residents to develop stewardship and monitoring plans for the Izembek-Moffet-Kinzarof Important Bird Area.

## **RECOGNITIONS**

In 1986, Izembek NWR and Izembek SGR became the first wetland site in the United States to receive global recognition by being officially listed as a “Wetland of International Importance” by the (RAMSAR) Convention on Wetlands of International Importance. The designation was made because the combined refuges provide exceptional waterbird habitat. The Izembek area is also recognized by the National Audubon Society under their Important Bird Areas Program.

The Izembek area qualifies as a Western Hemispheric Shorebird Reserve Network Site and possibly as an East Asian Australasian Shorebird Reserve Network Site; more surveys would be necessary to determine the appropriate designations (Tibbitts et al. 1996).

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Marla Carter assembled information from USFWS about the Izembek NWR and surrounding area, including the refuge.

Jason Graham and Frances Inoue prepared the maps depicting resources, uses, and land status of the Izembek SGR.

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## **TABLES AND FIGURES**





Table A1.—Climate normals, means, and extreme weather readings for Cold Bay, Alaska. Normals based on 1961-1990 records.

Source: (Western Regional Climate Center) <http://www.wrcc.dri.edu/cgi-bin/clilcd.pl?ak25624>

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
TEMPERATURE (Deg. F)													
Normal Daily Maximum	33.1	32.0	34.8	37.9	44.4	50.4	55.1	55.9	52.2	44.3	38.9	35.3	42.9
Normal Daily Minimum	24.1	22.8	25.0	28.6	34.8	40.9	46.0	47.1	43.2	34.8	29.9	26.6	33.7
Record Highest	51	50	56	60	67	72	77	78	76	69	59	54	
Year	1993	1991	1974	1948	1979	1995	1960	1948	1985	1964	1986	1990	
Record Lowest	-8	-9	-13	4	18	29	33	33	26	10	1	-1	
Year	1989	1947	1971	1976	1973	1952	1982	1946	1992	1976	1963	1979	
PRECIPITATION (in)													
Normal	2.84	2.27	2.10	1.97	2.29	2.10	2.52	3.24	4.41	4.34	4.19	3.67	36.00
Maximum Monthly	8.46	7.87	4.70	6.55	6.37	6.98	6.13	9.97	9.79	8.02	8.94	7.31	
Year	1948	1944	1977	1979	1958	1952	1982	1951	1965	1968	1960	1983	
Minimum Monthly	0.60	0.08	0.41	0.02	0.54	0.12	0.28	1.10	0.91	1.88	1.15	0.19	
Year	1956	1950	1972	1948	1992	1962	1950	1975	1952	1961	1975	1956	
WIND (mph)													
Mean Speed	17.6	17.8	17.3	17.6	16.1	15.8	15.7	16.4	16.3	16.8	17.5	17.5	16.9
Prevailing Direction Through 1964	SSE	SSE	NNW	SSE	SSE	WNW	SSE	SSE	SSE	WSW	SSE	NNW	
Peak Gust													
Direction	SE	SE	E	SE	SE	SE	S	SE	S	S	SE	SE	
Speed	80	83	76	85	72	69	58	81	95	87	75	85	
Year	1987	1989	1987	1995	1991	1993	1992	1985	1988	1995	1993	1994	
SKY COVER (mean number of days)													
Clear	2.4	1.9	1.9	0.6	0.5	0.4	0.2	0.2	0.3	0.7	1.1	1.6	11.9
Partly Cloudy	5.5	4.6	5.9	3.8	2.8	2.6	2.3	1.9	3.5	5.2	5.4	5.3	48.7
Cloudy	23.1	21.8	23.2	25.6	27.7	27.0	28.5	28.9	26.3	25.2	23.5	24.1	304.7
Days of Precipitation (> 0.01 inches)	19.0	17.3	18.0	16.1	17.4	16.0	16.7	19.9	20.7	22.7	21.6	20.6	225.9

Table A2.—Aerial fall survey data for Pacific brant staging at Izembek Lagoon and adjacent areas.<sup>1</sup> (INWR and Migratory Bird Management, FWS).

YEAR <sup>2</sup>	N <sup>3</sup>	MEAN	1SD	SE(95%)	DATA FROM INDIVIDUAL SURVEYS					SUM	MID-WINTER <sup>4</sup>
1975	2	169229	141858	197193	68920	269537				338457	123430
1976	1	107784								107784	122045
1977	3	116298	29918	33896	92063	107094	149737			348894	146967
1978											162887
1979	2	128204	5082	7064	124610	131797				256407	129413
1980	2	127667	7809	10855	122145	133189				255334	146365
1981	1	180734								180734	194197
1982	2	125177	30785	42793	103409	146945				250354	121044
1983	2	184022	51037	70945	147933	220110				368043	109314
1984	2	160601	3018	4195	158467	162735				321202	133430
1985	2	122673	23882	33197	105786	139560				245346	144802
1986	3	108582	21776	24671	93484	98718	133544			325746	136235
1987	5	136765	16028	14024	112106	149290	129878	150415	142138	683827	108908
1988	4	123822	20729	20315	106221	106435	147013	135620		495289	146963
1989	6	135041	21765	17412	100913	114221	146926	151943	147329	148915	810247
1990	6	123551	23451	18761	121422	107386	120691	169934	109178	112697	741308
1991	7	128784	19964	14766	105563	125585	152944	120434	106342	136978	153640
1992	6	119965	24182	19345	127204	140071	107010	94172	153674	97656	719787
1993	7	143375	19253	14240	145145	159833	131311	106035	157263	146196	157844
1994	5	142701	21954	19209	111536	131572	153629	168906	147860		713503
1995	6	152613	18877	15102	118948	171709	152345	166210	146234	160232	915678
1996	7	118188	35439	26211	119439	142809	92044	181361	99724	117474	74463
1997	4	130104	31816	31180	121926	175205	100371	122913			520415
1998	5	117312	37622	32919	97272	92406	179741	125738	91404		586561
1999	5	131134	26437	23164	129566	118265	99179	170731	137928		655669
2000	5	151216	27717	24252	131503	113423	179495	169649	162012		756082
2001	2	112554	753	1047	113086	112021					225107
2002	5	115839	15779	13806	98268	102171	121720	120027	137009		579195
2003	5	135944	7072	6188	144184	138841	139571	127669	129455		679720

<sup>1</sup> Survey area includes Izembek and Kinzarof Lagoons; Big, Middle, and Little Lagoons; Hook Bay; and St. Catherine's Cove.<sup>2</sup> Missing data from a second survey that was conducted on 10/6/81 by R. King/R. Gill.<sup>3</sup> Number of surveys.<sup>4</sup> Mid-winter index from aerial surveys in over wintering areas in Mexico, Washington, Oregon, and California; Alaska included 1985-present.

Table A3.—Results of Tundra Swan breeding population surveys on the Izembek NWR Unit, 1978-2003.<sup>1</sup> (INWR).

Year	Date	Number or Percent of Swans Observed												Total		Neck Collars Obs.	Est. # Breeding Pairs <sup>2</sup>	Density <sup>3</sup>	
		Single	% Single	Single+ Nest	% Single+ Nest	Pair (# of birds)	% Pair of birds	Pair (# of birds)	% Pair + Nest	Pair + Brood	% Pair + Brood	Flocks	% Flocks	Nests	Swans			Breeding Pairs	Swans
1978	5/8	6	8	0	0	26	33	18	23	0	0	28	36	9	78	0	25.0	0.08	0.25
1979	4/25, 4/28	10	5	0	0	94	46	26	13	0	0	75	37	13	205	12	65.0	0.16	0.50
1980	5/14, 5/15	9	4	0	0	84	36	60	26	0	0	80	34	30	233	1	76.5	0.18	0.56
1981	5/13-5/15	16	8	0	0	94	48	58	29	0	0	29	15	29	197	21	84.0	0.20	0.48
1982	6/2, 6/6	11	5	0	0	92	41	68	30	0	0	55	24	34	226	23	85.5	0.21	0.55
1983	5/31, 6/1	8	4	0	0	94	41	48	21	0	0	77	34	24	227	37	75.0	0.18	0.55
1984	6/7, 6/8	5	2	0	0	54	24	78	35	0	0	85	38	39	222	42	68.5	0.17	0.54
1985	5/28, 5/30, 6/1	20	8	0	0	52	20	54	20	0	0	140	53	27	266	32	63.0	0.15	0.64
1986	5/20	11	5	0	0	66	28	70	30	0	0	90	38	35	237	24	73.5	0.18	0.57
1987	5/19	7	3	0	0	50	23	76	36	0	0	81	38	38	214	30	66.5	0.16	0.52
1988	5/18, 5/19	8	6	0	0	50	38	34	26	0	0	41	31	17	133	7	46.0	0.11	0.32
1989	5/30, 5/31	3	2	0	0	80	47	18	11	0	0	69	41	9	170	6	50.5	0.12	0.41
1990	5/21, 5/22	9	5	0	0	32	17	46	25	0	0	99	53	23	186	3	43.5	0.11	0.45
1991	5/19	7	3	1	0.4	30	13	48	21	0	0	138	62	25	224	0	43.5	0.11	0.54
1992	5/18, 5/19	13	6	7	3	44	19	22	10	0	0	140	62	18	226	0	46.5	0.11	0.55
1993	5/17	9	4	3	1	54	22	42	17	0	0	134	55	24	242	0	55.5	0.13	0.58
1994	5/20	13	6	2	1	56	24	42	18	0	0	120	52	23	233	0	57.5	0.14	0.56
1995	5/17, 5/18	7	4	3	2	50	32	34	22	0	0	64	41	20	158	2	48.5	0.12	0.38
1996	5/14	3	1	0	0	50	24	44	21	0	0	112	54	22	209	3	48.5	0.12	0.50
1997		-				-			-					-	-	-	-	-	-
1998	5/19	23	14	2	1	44	27	4	2	0	0	90	55	4	163	0	37.5	0.09	0.39
1999	5/24, 5/26	16	12	1	1	66	50	6	5	0	0	43	33	4	132	0	45.0	0.11	0.32
2000	6/5	13	15	2	2	36	42	0	0	2	2	32	38	3	85	0	27.5	0.07	0.21
2001	5/19	12	16	4	5	16	21	10	13	0	0	35	45	9	77	0	23.0	0.06	0.19
2002	6/12-6/13	1	2	1	2	38	67	6	11	8	14	3	5	8	57	-	27.5	0.07	0.14
2003	5/15	10	14	3	4	28	39	18	25	0	0	13	18	12	72	-	31.0	0.07	0.17
Mean		10.0	6.4	1.2	0.9	55.2	32.9	37.2	19.5	0.4	0.7	74.9	39.6	20.0	178.9	10.6	52.6	0.13	0.43

<sup>1</sup> Survey area Bechevin Bay to Cathedral River. 1978 (315.5mi<sup>2</sup>), 1979 on (413.9mi<sup>2</sup>/1076km<sup>2</sup>). All wetlands <500 feet ASL.<sup>2</sup> Estimated breeding pairs = Observed pairs + 1/2 Singles (Note: Singles w/nests counted as breeding pairs).<sup>3</sup> Birds/mi<sup>2</sup>.

Table A4.—Aerial fall survey data for Cackling/Canada geese staging at Izembek State Game Refuge and the Adjacent Izembek National Wildlife Refuge.<sup>a</sup>(INWR and Migratory Bird Management, FWS).

Year	No. Surveys	Mean	SE (+ 95%)	Low	Peak
1975	2	47,429	43,984	25,055	69,803
1976	1	36,308	0		
1977	3	20,918	10,565	10,330	27,908
1979	1	44,828	0		
1980	2	36,253	26,356	22,846	49,660
1981	1	65,621	0		
1982	2	37,770	29,050	22,923	52,477
1983	2 <sup>b</sup>	49,907	0		
1984	31	36,527	4,375	12,550	63,548
1985	2	50,529	3,281	48,860	52,198
1986	4	30,904	13,613	18,855	45,022
1987	4	35,727	8,259	24,090	44,261
1988	5	35,182	7,720	22,066	45,231
1989	5	29,978	7,555	17,828	40,549
1990	6	45,751	11,852	31,480	72,445
1991	8	38,132	11,375	20,223	67,538
1992	9	52,370	25,330	34,493	78,263
1993	12	54,156	30,801	31,699	74,720
1994	3	69,885	15,757	62,956	78,700
1995	6	57,406	26,770	39,372	74,670
1996	6	43,233	3,051	38,570	48,098
1997	3	45,414	16,358	32,300	60,914
1998	6	48,976	6,912	33,100	58,738
1999	8	44,795	3,850	39,554	57,283
2000	5	42,156	10,271	27,289	58,687
2001	2	38,739	1,064	38,196	39,282
2002	5	45,394	8,704	33,339	54,570
2003	5	32,855	8,636	17,076	43,600
Mean	5.44	43,469	11,982	29,377	56,590

<sup>a</sup> Surveys done collectively by Izembek NWR and Region 7 MBM. Survey period is from 25 September until departure in late October.

<sup>b</sup> Does not include data from October 12 survey.

Table A5.— Seasonal occurrence of shorebirds at Izembek SGR and adjacent areas. (INWR and US Geological Survey).

Species	Spring Migrant	Breeder	Autumn Migrant	Winter Resident	Wintering Area
Black-bellied Plover	?		X		Temperate Coastal areas, cosmopolitan
Pacific Golden-Plover	X	?	X		NE Africa to Pacific Islands
Semipalmated Plover	X	X	X		Coastal southern N America to northern S. America
Black Oystercatcher	*	*	*	*	Coastal Pacific from Baja to Aleutians
Spotted Redshank			X		Central Africa to SE Asia
Greenshank			*		Coastal W. Europe to Australasia (+ interior Central Africa)
Greater Yellowlegs	*		X		Coastal central N. America to S. America
Lesser Yellowlegs	X		*		Southern N. America to S. America
Wandering Tattler	X	?	X		NE Australia, Oceania, SW North American coast
Gray-tailed Tattler			X		Coastal Australia, Oceania
Whimbrel	X		X		Temperate coastal cosmopolitan
Bristle-thighed Curlew	X		X		Oceania, Polynesia
Hudsonian Godwit	?		*		SE South America
Bar-tailed Godwit	*		X		Coastal Europe to Australia
Marbled Godwit	X		X		Temperate coastal N. America to Central America
Ruddy Turnstone	X		X	?	Temperate coastal, cosmopolitan
Black Turnstone	X	?	X		Pacific coast from N. BC to Mexico
Red Knot	?		X		Temperate coastal, cosmopolitan
Sanderling	X		X	X	Temperate coastal, cosmopolitan
Semipalmated Sandpiper			X		Central America, Caribbean, N. South America

-continued-

Table A5. Page 2 of 2.

Species	Spring Migrant	Breeder	Autumn Migrant	Winter Resident	Wintering Area
Western Sandpiper	X	*	X		Pacific coast of South America
Least Sandpiper	X	X	X		Pacific coast of South America
Baird's Sandpiper			X		W to SE South America (coastal and interior)
Pectoral Sandpiper	?		X		Interior S. S. America, Australia, Tasmania, New Zealand
Sharp-tailed Sandpiper			X		Australasia, Tasmania, New Zealand
Rock Sandpiper	X	X	X	X	NW Pacific coast
Dunlin	X	X	X	*	Temperate Northern Hemisphere, cosmopolitan
Short-billed Dowitcher	X	X	X		Central coast of N. America to central coast of S. America
Long-billed Dowitcher	*		X		N. America, NW to SE, Central America
Wilson's Snipe	X	X	X		Temperate Northern Hemisphere, cosmopolitan
Red-necked Phalarope	*	*	X		Ocean, W. South America, W. African coast
Red Phalarope	*		X		Ocean, W. Africa, W. South America
Totals	22	9	32	4	

X = Species recorded during USGS-BRD shorebird assessment (Tibbitts et al. 1996).

\* = Species recorded in Izembek NWR records.

? = Not documented on Izembek NWR, but documented elsewhere on the Alaska Peninsula.

Table A6.–Birds of Izembek Lagoon.

Common name	Scientific name	Occurrence
Red-throated loon	<i>Gavia stellata</i>	High use
Pacific loon	<i>Gavia pacifica</i>	Intermediate use
Common loon	<i>Gavia immer</i>	High use
Horned grebe	<i>Podiceps auritus</i>	Intermediate use
Red-necked grebe	<i>Podiceps grisegena</i>	High use
Double-crested cormorant	<i>Phalacrocorax auritus</i>	High use
Pelagic cormorant	<i>Phalacrocorax pelagicus</i>	High use
Red-faced cormorant	<i>Phalacrocorax urile</i>	Intermediate use
Tundra (whistling) swan	<i>Cygnus columbianus</i>	Intermediate use
Emperor goose	<i>Chen canagica</i>	High use
Brant	<i>Branta bernicla</i>	High use
Cackling goose	<i>Branta hutchinsii minima</i>	High use
Taverner's goose	<i>B. h. taverneri</i>	High use
Aleutian cackling goose	<i>B. h. leucopareia</i>	High use
Green-winged teal	<i>Anas crecca</i>	Intermediate use
Mallard	<i>Anas platyrhynchos</i>	High use
Northern pintail	<i>Anas acuta</i>	High use
Northern shoveler	<i>Anas cylpeata</i>	Intermediate use
Gadwall	<i>Anas strepera</i>	Intermediate use
American wigeon	<i>Anas americana</i>	Intermediate use
Eurasian wigeon	<i>Anas penelope</i>	Rare use
Canvasback	<i>Aythya valisineria</i>	Rare use
Greater scaup	<i>Aythya marila</i>	High use
Common eider	<i>Somateria mollissima</i>	High use
King eider	<i>Somateria spectabilis</i>	Intermediate use
Steller's eider	<i>Polysticta stelleri</i>	High use
Harlequin duck	<i>Histrionicus histrionicus</i>	High use
Long tailed duck	<i>Clangula hyemalis</i>	High use
Common goldeneye	<i>Bucephala clangula</i>	High use
Barrow's goldeneye	<i>Bucephala islandica</i>	Rare use
Bufflehead	<i>Bucephala albeola</i>	Intermediate use
Black scoter	<i>Melanitta nigra</i>	High use
Surf scoter	<i>Melanitta perspicillata</i>	Rare use
White-winged scoter	<i>Melanitta fusca</i>	Intermediate use
Common merganser	<i>Mergus merganser</i>	Intermediate use
Red-breasted merganser	<i>Mergus serrator</i>	High use
Bald eagle	<i>Haliaeetus leucocephalus</i>	High use
Steller's sea-eagle	<i>Haliaeetus pelagicus</i>	Not known
Northern harrier (marsh hawk)	<i>Circus cyaneus</i>	Not known
Rough-legged hawk	<i>Buteo lagopus</i>	Not known

-continued-

Table A6.–Page 2 of 3.

Common name	Scientific name	Occurrence
Golden eagle	<i>Aquila chrysaetos</i>	Not known
Merlin	<i>Falco columbarius</i>	Intermediate use
Peregrine falcon	<i>Falco peregrinus</i>	High use
Gyr Falcon	<i>Falco rusticolus</i>	High use
Willow ptarmigan	<i>Lagopus lagopus</i>	Not known
Rock ptarmigan	<i>Lagopus mutus</i>	Not known
Sandhill crane	<i>Grus canadensis</i>	Not known
Pacific golden plover	<i>Pacificia fulva</i>	Intermediate use
Semipalmated plover	<i>Charadrius semipalmatus</i>	Intermediate use
American black oystercatcher	<i>Haematopus bachmani</i>	Rare use
Greater yellowlegs	<i>Tringa melanoleuca</i>	Rare use
Lesser yellowlegs	<i>Tringa flavipes</i>	Rare use
Wandering tattler	<i>Heteroscelus incanus</i>	Rare use
Whimbrel	<i>Numenius phaeopus</i>	Rare use
Bar-tailed godwit	<i>Limosa lapponica</i>	Rare use
Ruddy turnstone	<i>Arenaria interpres</i>	Intermediate use
Sanderling	<i>Calidris alba</i>	High use
Western sandpiper	<i>Calidris mauri</i>	Rare use
Least sandpiper	<i>Calidris minutilla</i>	Intermediate use
Rock sandpiper	<i>Calidris ptilocnemis</i>	High use
Dunlin	<i>Calidris alpina</i>	Intermediate use
Short-billed dowitcher	<i>Limnodromus griseus</i>	Intermediate use
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>	Intermediate use
Common snipe	<i>Gallinago gallinago</i>	Intermediate use
Red-necked (northern) phalarope	<i>Phalaropus lobatus</i>	Intermediate use
Red phalarope	<i>Phalaropus fulicaria</i>	Intermediate use
Pomarine jaeger	<i>Stercorarius pomarinus</i>	Intermediate use
Parasitic jaeger	<i>Stercorarius parasiticus</i>	Intermediate use
Long-tailed jaeger	<i>Stercorarius longicaudus</i>	Intermediate use
Bonaparte's gull	<i>Larus philadelphia</i>	Not known
Mew gull	<i>Larus canus</i>	High use
Glaucous-winged gull	<i>Larus glaucescens</i>	High use
Glaucous gull	<i>Larus hyperboreus</i>	Intermediate use
Black-legged kittiwake	<i>Rissa tridactyla</i>	High use
Sabine's gull	<i>Xema sabini</i>	Rare use
Arctic tern	<i>Sterna paradisaea</i>	High use
Aleutian tern	<i>Sterna aleutica</i>	Intermediate use
Common murre	<i>Uria aalge</i>	Intermediate use
Thick-billed murre	<i>Uria lomvia</i>	Intermediate use
Pigeon guillemot	<i>Cephus columba</i>	Intermediate use

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Table A6.–Page 3 of 3.

Common name	Scientific name	Occurrence
Marbled murrelet	<i>Brachyramphus marmoratus</i>	Rare use
Kittlitz's murrelet	<i>Brachyramphus brevirostris</i>	Rare use
Ancient murrelet	<i>Synthliboramphus antiquus</i>	Rare use
Cassin's auklet	<i>Ptychoramphus aleuticus</i>	Rare use
Parakeet auklet	<i>Cyclorrhynchus psittacula</i>	Rare use
Least auklet	<i>Aethia pusilla</i>	Rare use
Crested auklet	<i>Aethia cristatella</i>	Rare use
Tufted puffin	<i>Fratercula cirrhata</i>	Intermediate use
Horned puffin	<i>Fratercula corniculata</i>	Intermediate use
Snowy owl	<i>Nyctea scandiaca</i>	Rare use
Short-eared owl	<i>Asio flammeus</i>	Not known
Belted kingfisher	<i>Ceryle alcyon</i>	Intermediate use
Tree swallow	<i>Tachycineta bicolor</i>	Intermediate use
Bank swallow	<i>Riparia riparia</i>	High use
Black-billed magpie	<i>Pica pica</i>	Intermediate use
Common raven	<i>Corvus corax</i>	High use
Black-capped chickadee	<i>Parus atricapillus</i>	Not known
Winter wren	<i>Troglodytes troglodytes</i>	Not known
American dipper	<i>Cinclus mexicanus</i>	Not known
Gray-cheeked thrush	<i>Cathrus minimus</i>	Not known
Hermit thrush	<i>Catharus guttatus</i>	Not known
American pipit	<i>Anthus rubescens</i>	High use
Northern shrike	<i>Lanius excubitor</i>	Not known
Orange-crowned warbler	<i>Vermivora celata</i>	Not known
Yellow warbler	<i>Dendroica petechia</i>	Not known
Wilson's warbler	<i>Wilsonia pusilla</i>	Not known
American tree sparrow	<i>Spizella arborea</i>	Not known
Savannah sparrow	<i>Passerculus sandwichensis</i>	High use
Fox sparrow	<i>Passerella iliaca</i>	Not known
Song sparrow	<i>Melospiza melodia</i>	Not known
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	High use
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Not known
Lapland longspur	<i>Calcarius lapponicus</i>	Not known
Snow bunting	<i>Plectrophenax nivalis</i>	Not known
McKay's bunting	<i>Plectrophenax hyperboreus</i>	Not known
Gray crowned rosy finch	<i>Leucostricte tephrocotis</i>	Not known
Common redpoll	<i>Carduelis flammea</i>	Not known
Hoary redpoll	<i>Carduelis hornemanni</i>	Not known

Table A 7.–Mammals of Izembek State Game Refuge. (Compiled from various sources including INWR; see text.)

Common name	Scientific name
Masked shrew	<i>Sorex cinereus</i>
Alaskan hare	<i>Lepus othus</i>
Arctic ground squirrel	<i>Spermophilus undulatus</i>
Northern red-backed vole	<i>Clethrionomys rutilus</i>
Tundra vole	<i>Microtus oeconomus</i>
Brown lemming	<i>Lemmus sibiricus</i>
Porcupine	<i>Erethizon dorsatum</i>
Gray whale	<i>Eschrichtius robustus</i>
Killer whale	<i>Orcinus orca</i>
Minke whale	<i>Balaenoptera acutorostrata</i>
Coyote	<i>Canis latrans</i>
Gray wolf	<i>Canis lupus</i>
Red fox	<i>Vulpes vulpes</i>
Brown (grizzly) bear	<i>Ursus arctos</i>
Short-tailed weasel	<i>Mustela erminea</i>
Least weasel	<i>Mustela nivalis</i>
Mink	<i>Mustela vison</i>
Wolverine	<i>Gulo gulo</i>
River otter	<i>Lutra canadensis</i>
Sea otter	<i>Enhydra lutris</i>
Steller's (northern) sea lion	<i>Eumetopias jubatus</i>
Walrus	<i>Odobenus rosmarus</i>
Harbor seal	<i>Phoca vitulina</i>
Northern fur seal	<i>Callorhinus ursinus</i>
Caribou	<i>Rangifer tarandus</i>

Table A8.—Finfish of Izembek State Game Refuge. (Compiled from various sources including INWR; see text.)

<b>Petromyzontidae</b>		<b>Gasterosteidae</b>	
<i>Lampetra camtschatica</i>	arctic lamprey	<i>Gasterosteus aculeatus</i>	threespine stickleback
<b>Clupeidae</b>		<i>Pungitius pungitius</i>	ninespine stickleback
<i>Clupea harengus pallasii</i>	Pacific herring	<b>Agonidae</b>	
<b>Salmonidae</b>		<i>Agonus acipenserinus</i>	sturgeon poacher
<i>Oncorhynchus gorbusha</i>	pink salmon	<i>Occella dodecaedron</i>	Bering poacher
<i>O. keta</i>	chum salmon	<i>Pallasina barbata</i>	tubenose poacher
<i>O. kisutch</i>	coho salmon	<b>Cyclopteridae</b>	
<i>O. nerka</i>	sockeye salmon	<i>Liparis cyclopus</i>	ribbon snailfish
<i>O. mykiss</i>	rainbow trout/steelhead	<b>Ammodytidae</b>	
<i>O. tshawytscha</i>	Chinook salmon	<i>Ammodytes hexapterus</i>	Pacific sand lance
<i>Salvelinus alpinus</i>	Arctic char	<b>Pholidae</b>	
<i>Salvelinus malma</i>	Dolly Varden	<i>Pholis laeta</i>	crescent gunnel
<b>Osmeridae</b>		<i>Pholis ornata</i>	saddleback gunnel
<i>Hypomesus pretiosus</i>	surf smelt	<b>Stichaeidae</b>	
<i>Mallotus villosus</i>	capelin	<i>Acantholumpenus mackayi</i>	prickleback
<i>Osmerus dentex</i>	arctic smelt	<i>Lumpenus sagitta</i>	snake prickleback
<i>Osmerus mordax</i>	rainbow smelt	<b>Pleuronectidae</b>	
<i>Hypomesus olidus</i>	pond smelt	<i>Hippoglossus stenolepis</i>	Pacific halibut
<b>Gadidae</b>		<i>Isopsetta isolepis</i>	butter sole
<i>Eleginus gracilis</i>	saffron cod	<i>Lepidopsetta bilineata</i>	rock sole
<i>Gadus macrocephalus</i>	Pacific cod	<i>Limanda aspera</i>	yellowfin sole
<i>Theragra calcogramma</i>	walleye pollock	<i>Limanda proboscidea</i>	longhead dab
<b>Hexagrammida</b>		<i>Liopsetta glacialis</i>	Arctic flounder
<i>Hexagrammos octogrammus</i>	masked greenling	<i>Platichthys stellatus</i>	starry flounder
<i>Hexagrammos stelleri</i>	white-spotted greenling	<i>Pleuronectes quadrituberculatus</i>	Alaska plaice
<i>Hexagrammos superciliosus</i>	rock greenling	<b>Trichodontidae</b>	
<i>Hexagrammos decagrammus</i>	kelp greenling	<i>Trichodon trichodon</i>	Pacific sandfish
<b>Cottidae</b>		<i>Microcottus stellaris</i>	brightbelly sculpin
<i>Cottus aleuticus</i>	coast range sculpin	<i>Myoxocephalus jaok</i>	plain sculpin
<i>Cottus cognatus</i>	slimy sculpin	<i>Blepsias bilobus</i>	crested sculpin
<i>Clinocottus acuticeps</i>	sharpnose sculpin	<i>Gymnocanthus pistilliger</i>	threaded sculpin
<i>Artedius fenestralis</i>	padded sculpin	<i>Myoxocephalus niger</i>	warthead sculpin
<i>Blepsias cirrhosus</i>	silverspotted sculpin		
<i>Gymnocanthus tricuspis</i>	arctic staghorn sculpin		
<i>Hemilepidotus hemilepidotus</i>	red Irish lord		
<i>Hemilepidotus jordani</i>	yellow Irish lord		
<i>Icelinus borealis</i>	Northern sculpin		
<i>Leptocottus armatus</i>	Pacific staghorn sculpin		
<i>Myoxocephalus polyacanthocephalus</i>	great sculpin		
<i>Myoxocephalus scorpioides</i>	arctic sculpin		

Table A9.–Izembek Moffet Bay Section streams estimated total escapement in 2007 (Murphy et al. 2008).

	<b>Sockeye Coho*</b>		<b>Pink</b>	<b>Chum</b>
Norma Bay Lakes	200	0	3,350	1,250
Mike's Duck Camp Creek	350	400	500	8,100
Norma Bay South	150	200	0	20,200
Third Bridge Creek	0	200	0	14,200
Frosty Creek	3,450	700	0	26,000
Blue Bill Lake	2,200	750	0	400
Outer Marker Lakes	1,500	400	0	150
Springs S. Frosty Creek	250	0	0	6,600
Second Bridge Creek	400	0	0	11,200
Joshua Green River	18,100	47,200	0	111,300
Moffet Springs Creek	2,200	2,900	0	19,700
Moffet Creek	3,800	1,200	0	30,300
Unnamed (312-40.04)	0	0	0	0
Unnamed (312-40.05)	0	0	0	100

\*Peak Escapement counts

Table A10.–Izembek-Moffet Bay Section commercial salmon harvest 2001-2007 (Murphy et al. 2008).

<b>Year</b>	<b>Socke</b>	<b>ye</b>	<b>Coho</b>	<b>Pink</b>	<b>Chum</b>
2001		10,270	23	639	74,191
2002		37,528	25	971	13,793
2003		16,338	37	591	9,868
2004		23,629	15	1,328	5,353
2005		61,082	901	1,503	27,810
2006		24,712	92	786	27,414
2007		22,536	142	4,713	68,310
2001-2007 average		28,014	176	N/A	32,391

Table A11.–Mean number of sea otters recorded during Aerial Waterfowl Surveys, 1981-2005 at Izembek Lagoon. (INWR and Migratory Bird Management, FWS 2008).

	Moffet Lagoon				Strawberry Point to Round Island				Round Island to Birdsall Island				Birdsall Is. to Grant Pt.			
Month	n	Mean	SE	Max	n	Mean	SE	Max	n	Mean	SE	Max	n	Mean	SE	Max
Jan	14	120.2	44	637	15	103.5	24.8	389	15	71.7	21.8	240	15	34.7	10.2	147
Feb	8	126.3	59.9	460	7	109.3	41.8	313	6	22.7	19.3	119	6	15.7	3.4	27
Mar	11	44.7	11.4	100	11	103.3	26.3	332	11	40.1	16.2	167	11	19.2	3.8	39
Apr	20	46.9	13.9	241	17	97.6	15.5	246	17	44.4	17.2	254	17	12.2	2.9	41
May	19	29.5	11.2	182	17	79.9	25.1	399	16	28.9	19.2	301	16	98.0	46.5	651
Aug	4	97.5	43.6	221	4	112.5	77.9	346	4	18.0	9.3	35	4	4.8	3.8	16
Sept	35	108.5	22.6	462	34	39.0	6.8	147	33	18.4	5.9	128	34	14.4	6.2	178
Oct	85	115.6	17.5	822	82	50.2	7.2	352	80	45.2	10.2	550	82	18.7	5.1	308
Nov	17	79.5	25.6	394	16	44.5	24.5	400	6	65.6	33.1	456	14	12.3	3.8	43
Dec	7	187.1	75.3	475	7	30.3	13.2	100	7	26.4	13.1	81	7	16.0	6.6	47

	Applegate Cove				Norma Bay				Izembek Lagoon (entire)			
Month	n	Mean	SE	Max	n	Mean	SE	Max	n	Mean	SE	Max
Jan	15	76.3	29.3	405	15	28.9	8.2	100	15	457.7	77.7	967
Feb	7	57.7	11.4	94	7	9.0	4.1	26	7	310	73.2	572
Mar	11	54.5	18.0	172	11	38.9	21.0	220	11	300.6	46.0	537
Apr	16	52.6	23.0	385	17	25.3	4.5	60	21	254.9	34.7	519
May	14	42.9	20.1	287	14	34.5	11.7	151	14	299.7	53.7	859
Aug	4	81.3	41.0	187	4	32.8	16.0	80	4	323.4	88.8	579
Sept	35	46.5	9.2	238	36	33.4	8.6	275	35	252.9	27.5	646
Oct	84	32.3	4.9	212	84	20.6	3.8	210	84	293.4	23.9	1070
Nov	16	16.9	5.6	80	16	33.7	11.7	180	16	264.4	46.3	610
Dec	7	56.3	29.1	218	7	28.3	15.0	113	7	344.4	93.6	608

n = number of surveys

SE = standard error

Max= maximum number recorded for all surveys

*Note:* Summary table created by cut and paste. Sea otter numbers recorded incidentally to waterfowl numbers, so probably conservative estimates.

Table A12.--Special Area Permit List for Izembek State Game Refuge, 1987-2007.

Special Area Permit	Issued	Activity
FG 00-II-0301	May 22, 2000	Aircraft Operation
FG 02-II-0263	April 26, 2002	Aircraft Operation
FG 07-II-0039	August 8, 2007	Research and Monitoring
FG 07-II-0039	August 28, 2007	Research and Monitoring
FG 01-II-0480	August 31, 2001	Aircraft Operation
FG 02-II-0263	April 26, 2002	Aircraft Operation
FG 04-II-0008	August 13, 2003	Aircraft Operation
FG 04-II-0015	October 3, 2003	Aircraft Operation
FG 04-II-0048	April 14, 2004	Aircraft Operation
FG 04-II-0048 (Amendment I)	April 19, 2004	Aircraft Operation
Application		Commercial Clam Harvesting
FG 04-II-0015	October 3, 2003	Aircraft Operation
FG 02-II-0625	October 9, 2002	Aircraft Operation
FG 02-II-0581	August 26, 2002	Research
FG 02-II-0225	April 8, 2002	ATV Operation
FG 01-II-0480	August 31, 2001	Aircraft Operation
FG 01-II-0379	July 9, 2001	Aircraft Operation
FG 01-II-0234	May 17, 2001	Aircraft Operation
FG 99-II-0276	May 20, 1999	Aircraft Operation
FG 98-II-0309	April 29, 1998	Aircraft Operation
FG 97-II-0767	September 30, 1997	Aircraft Operation
FG 97-II-0658	July 30, 1997	Aircraft Operation
FG 97-II-02636	August 21, 1997	Aircraft Operation
FG 95-II-0584 (Amendment I)	September 22, 1995	ATV Operation
FG 95-II-0584	September 1, 1995	ATV Operation
FG 95-II-0497	July 6, 1995	Aircraft Operation
FG 95-II-0243	May 23, 1995	Aircraft Operation
FG 93-II-0696	September 30, 1993	Aircraft And ATV Operation
FG 93-II-0698	September 30, 1993	Aircraft Operation
FG 93-II-0657 (Amendment I)	September 24, 1993	Aircraft Operation
FG 93-II-0657	September 10, 1993	Aircraft Operation
FG 93-II-0603	August 16, 1993	ATV Operation
FG 02-II-0660	September 2, 1992	ATV Operation
FG 92-II-0497	July 10, 1990	ATV Operation
FG 92-II-0338	May 6, 1992	Aircraft Operation
FG 92-II-0312	May 6, 1992	Aircraft Operation
FG 92-II-0276	April 24, 1992	Aircraft Operation
FG 92-II-0207	April 23, 1992	ATV Operation
FG 92-II-185	April 22, 1992	Aircraft And ATV Operation
FG 92-II-0158	April 16, 1992	Aircraft Operation
FG 92-II-0132	April 13, 1992	Aircraft Operation
FG 91-II-0531	September 23, 1991	ATV Operation
FG 91-II-0522	September 17, 2019	Aircraft Operation
FG 91-II-0517	September 11, 1991	Aircraft Operation
FG 91-II-0450	August 5, 1991	ATV Operation

Table A13.—Species listed as endangered or threatened under state or federal law, and ADF&G Species of Special Concern.

Federally Endangered (as of October 2008)	State Endangered (effective 11/1993)
Short-tailed Albatross <i>Diomedea albatrus</i>	Short-tailed Albatross <i>Diomedea albatrus</i>
Eskimo Curlew <i>Numenius borealis</i>	Eskimo Curlew <i>Numenius borealis</i>
Blue whale <i>Balaenoptera musculus</i>	Blue whale <i>Balaenoptera musculus</i>
Humpback whale <i>Megaptera novaengliae</i>	Humpback whale <i>Megaptera novaengliae</i>
North Pacific right whale <i>Eubalena glacialis</i>	Right whale <i>Eubalena glacialis</i>
Aleutian Island fern	
Steller sea lion <i>Eumetopias jubatus</i> (west of 144°)	
Bowhead whale <i>Balaena mysticetus</i>	
Fin whale <i>Balaenoptera physalus</i>	
Sperm whale <i>Physeter macrocephalus</i>	
Sei whale <i>Balaenoptera borealis</i>	
Leatherback turtle <i>Dermochelys coriacea</i>	
Cook Inlet beluga whale <i>Delphinapterus leucas</i>	

Federally Threatened/Candidate (as of Oct 2008)	State Species of Special Concern (effective 11/1998)
Spectacled Eider <i>Somateria fischeri</i>	Spectacled Eider <i>Somateria fischeri</i>
Steller's Eider <i>Polysticta stelleri</i>	Steller's Eider <i>Polysticta stelleri</i>
Northern sea otter (SW AK pop.) <i>Enhydra lutris kenyoni</i>	Sea otter <i>Enhydra lutris</i>
Steller sea lion (east of 144°) <i>Eumetopias jubatus</i>	Steller sea lion <i>Eumetopias jubatus</i>
Loggerhead turtle <i>Caretta caretta</i>	Harbor seal <i>Phoca vitulina</i>
Green turtle <i>Chelonia mydas</i>	Chinook salmon (fall run, Snake River) <i>Oncorhynchus tshawytscha</i>
Polar bear <i>Ursus maritimus</i>	Aleutian cackling goose <i>Branta hutchinsii leucopareia</i>
Kittlitz's Murrelet: Cand. <i>Brachyramphus brevirostris</i>	Cook Inlet beluga whale <i>Delphinapterus leucas</i>
Spotted Seal: Cand. <i>Phoca largha</i>	American Peregrine Falcon <i>Falco peregrinus anatum</i>
Ringed Seal: Cand. <i>Phoca hispida</i>	Arctic Peregrine Falcon <i>Falco peregrinus tundrius</i>
Ribbon Seal: Cand. <i>Histiophoca fasciata</i>	Northern Goshawk (Southeast AK) <i>Accipiter gentilis laingi</i>
Bearded Seal: Cand. <i>Erignatus barbatus</i>	Olive-sided Flycatcher <i>Contopus cooperi</i>
Pacific Herring (SE AK): Cand. <i>Clupea pallasii</i>	Gray-cheeked Thrush <i>Catharus minimus</i>
	Townsend's Warbler <i>Dendroica townsendi</i>
	Blackpoll Warbler <i>Dendroica striata</i>
	Kenai brown bear <i>Ursus arctos horribilis</i>
	Bowhead whale <i>Balaena mysticetus</i>

Table A14.-Invertebrates of Izembek State Game Refuge (Dr. Peter McRoy, unpublished data compiled from incidental observations during eelgrass research).

Taxa	Phylum	Class	Genus	Species	Common name	Notes
Protozoa	Foraminifera		<i>Gromia</i>	<i>oviformis</i>	foram	2 mm soft brown ball on eelgrass, various other forms
Sponge	Porifera		<i>Haliclona</i>	<i>sp</i>	sponge	
Jellyfish	Coelenterata		<i>Gonionemus</i>	<i>vertens vertens</i>	orange jellyfish	1-2 cm common in eelgrass
	Coelenterata		<i>Obelia</i>	<i>longissima</i>	hydroid	epiphytic on eelgrass
			<i>Haliclystis</i>	<i>stenjegeri</i>	jellyfish	sessile stalked jellyfish
			<i>Albietinaria</i>	<i>turgida</i>	hydrozoan	
	Coelenterata		<i>Thuiaria</i>	<i>cylindrica</i>	hydrozoan	
	Coelenterata		<i>unknown</i>	<i>sp.</i>	anemie	unidentified
Worms	Annelida	Polychaeta	<i>Nephtys</i>	<i>caeca</i>	worm	large worm in eelgrass & sand
		Polychaeta	<i>Arenicola</i>	<i>glacialis</i>	lugworm	common above eelgrass
Coelenterata		Polychaeta	<i>Haploscoloplos</i>	<i>panamensis</i>	worm	common in mud & sand
Coelenterata		Polychaeta	<i>Haploscoloplos</i>	<i>sp.</i>	worm	common in mud
		Polychaeta	<i>Eudalia</i>	<i>viridis</i>	worm	
		Polychaeta	<i>Harmothoe</i>	<i>imbricata</i>	scale worm	common in eelgrass
		Polychaeta	<i>Pholoe</i>	<i>minuta</i>	scale worm	
		Polychaeta	<i>Hesperonoe</i>	<i>sp.</i>	scale worm	inhabits echiurid tubes
		Polychaeta	<i>Laonice</i>	<i>cirrata</i>	siponid worm	
		Polychaeta	<i>Rhynchospio</i>	<i>sp.</i>	siponid worm	very common in eelgrass beds
		Polychaeta	<i>Cistenides</i>	<i>granulata</i>		
		Polychaeta	<i>Eteone</i>	<i>spetsbergensis</i>		common
		Polychaeta	<i>Nereis</i>	<i>virens</i>		
		Polychaeta	<i>Travisia</i>	<i>carnea</i>		
		Polychaeta	<i>Capitella</i>	<i>capitata</i>	worm	common in eelgrass
		Polychaeta	<i>Capitella</i>	<i>sp.</i>		
		Polychaeta	<i>Spirorbis</i>	<i>sp.</i>	worm	small epiphyte, common
		Polychaeta	<i>Orbinidae</i>			
		Polychaeta	<i>Maldanidae</i>			
		Polychaeta	<i>Spio</i>	<i>filicornis</i>		
		Polychaeta	<i>Spionidae</i>			
		Polychaeta	<i>Polydora</i>	<i>socialis</i>		
		Polychaeta	<i>Owenia</i>	<i>fusiformis</i>		
	Echiuroidea		<i>Echiurus</i>	<i>echiurus alaskanus</i>		abundant in firm mud & silt
Molluscs	Mollusca	Gastropoda	<i>Acumaea</i>	<i>sp.</i>		Limpet
			<i>Acumaea</i>	<i>persona</i>		Limpet
			<i>Acumaea</i>	<i>testudinalis scutum</i>		Limpet
			<i>Mytilis</i>	<i>edulis</i>	Pacific blue mussel	

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Table A14.-Page 2 of 3.

Taxa	Phylum	Class	Genus	Species	Common name	Notes
			<i>Thais</i>	<i>lamellosa</i>	Frilled dogwinkle	
			<i>Thais</i>	<i>canaliculata</i>	Channeled dogwinkle	
			<i>Littorina</i>	<i>scutulata</i>	Checkered periwinkle	
			<i>Littorina</i>	<i>atkana</i>		
			<i>Aeolida</i>	<i>papillosa</i>		
			<i>Mopalia</i>	<i>sp.</i>		
			<i>Macoma</i>	<i>balthica</i>		
			<i>Macoma</i>	<i>irus</i>		
			<i>Spisula</i>	<i>polynya</i>		
			<i>Spisula</i>	<i>alaskana</i>		
			<i>Tellina</i>	<i>lutea</i>		
			<i>Mya</i>	<i>arenaria</i>		
			<i>Mya</i>	<i>japonica</i>		
			<i>Clinocardium</i>	<i>nuttalli</i>		
			<i>Siliqua</i>	<i>patula</i>		
			<i>Natica</i>	<i>clausa</i>		
			<i>Lacuna</i>	<i>variegata</i>		
			<i>Margarites</i>	<i>helicinus</i>		
			<i>Turtonia</i>	<i>occidentalis (minuta)</i>		
Arthropoda	Arthropoda		<i>Evadne</i>			
			<i>Podon</i>	<i>sp.</i>		
			<i>Bosmina</i>	<i>sp.</i>		
			<i>Eurytemora</i>	<i>sp.</i>		
			<i>Diaptomus</i>	<i>sp.</i>		
			<i>Balanus</i>	<i>glandula</i>	barnacle	
			<i>Balanus</i>	<i>cariosus</i>	barnacle	
			<i>Lepas sp.</i>	<i>anatifera</i>		
			<i>Diastylis</i>	<i>sp.</i>		
			<i>Edotea</i>	<i>sp.</i>		
			<i>Munna</i>	<i>sp.</i>		
			<i>Pentidotea</i>	<i>wosnesenskii</i>		
			<i>Idothea</i>	<i>sp.</i>		
			<i>Idothea</i>	<i>fewkesi</i>		
			<i>Mesidotea</i>	<i>entomon</i>		
			<i>Saduria</i>	<i>entomon</i>		
			<i>Corophium</i>	<i>sp.</i>		
			<i>Metopella</i>	<i>nasuta</i>		

-continued-

Table A14.–Page 3 of 3.

Taxa	Phylum	Class	Genus	Species	Common name	Notes
Echinoderms	Echinodermata		<i>Gammarus</i>	<i>sp.</i>		
			<i>Caprella</i>	<i>drepanochir</i>		
			<i>Caprella</i>	<i>alaskana</i>		
			<i>Calliopius</i>	<i>laeviusculus</i>		
			<i>Oradarea</i>	<i>sp.</i>		
			<i>Ampithoe</i>	<i>sp.</i>		
			<i>Anisogammarus</i>	<i>sp.</i>		
			<i>Crangon</i>	<i>septemspinosa</i>		
			<i>Crangon</i>	<i>dalli</i>		
			<i>Heptacarpus</i>	<i>camtschatica</i>		
			<i>Pagurus</i>	<i>hirsutiusculus</i>		
			<i>Oregonia</i>	<i>gracilis</i>		
			<i>Telemessus</i>	<i>cheiragonus</i>		
			<i>Fucellia</i>	<i>sp.</i>		
			<i>Phoxichilidium</i>	<i>sp.</i>		
			<i>Strongylocentrotus</i>	<i>droebachiensis</i>		
			<i>Pedicellaster</i>	<i>typicus (or magister)</i>		
			<i>Leptasterias</i>	<i>sp.</i>		
			<i>Evanasterias</i>	<i>troschelii</i>		
			<i>Henricia</i>	<i>leviuscula</i>		
			<i>Leptosynapta</i>	<i>sp.</i>		
			<i>Dendraster</i>	<i>excentricus</i>		

**APPENDIX B**  
**PUBLIC SCOPING MEETINGS**  
**IZEMBEK STATE GAME REFUGE MANAGEMENT PLAN**



## **Summary of Public Scoping Meetings**

Public scoping meetings were held at four local communities in 2004: Cold Bay, September 22; King Cove, September 23; Sand Point on September 24; and Nelson Lagoon, October 20. A public meeting was also held in Anchorage on May 19, 2005. The public meetings were held in coordination with the U.S. Fish and Wildlife Service (FWS), who were beginning work on a revision to the Izembek National Wildlife Refuge (NWR) Comprehensive Conservation Plan. The meetings were designed both to inform the public about the reasons and process for revising the management plan and to generate specific suggestions for clarifying and improving management policies for the state Refuge and the NWR.

**Meeting Design** The introduction to each meeting included a short informal presentation about the history and geography of the Refuge area and an overview of both the state and federal management plan development process. Comments received were written down at the meetings and later transcribed in meeting summaries. All meeting participants were given a questionnaire and encouraged to provide more detailed comments in writing.

**Mail-in Comments** Public comments received by mail were summarized by category and further identified by which agency had jurisdiction for the specific comment/topic presented.

**Izembek National Wildlife Refuge**  
**Comprehensive Conservation Plan Revision**  
**Scoping Meetings**

**Cold Bay, Alaska**

**September 22, 2004**

- Maintain access to Wilderness for subsistence activities and sport hunting
- Subsistence is really consumptive use
- Did Congress come to Cold Bay prior to Wilderness designation?
- Need to have workshop with Cold Bay residents (and others) to work out specifics of access needs, impacts, and needs for restrictions
- Camping area at Blinn lake—with a food cache?
- First bridge needs a new parking and viewing area
- Pullouts for viewing along Outer marker and Grant Point Road
- Grant Point boat launch—want modest improvements only—protect resources without increasing use
- Cold Bay doesn't want to be paved over, but want modest improvements to make the place nicer for residents and visitors
- Example—Mortensen's lagoon access
- 17(b) access at Russell Creek—would like to see a bridge
- If I am a sport fish guide and I want to take clients glass ball hunting what do I do?
- Make it more clear what people need permits for and who do you get it from
- Types of crafts allowed on the lagoon—individual permits for aircraft and ATV's
- Look at restricting airboats and hovercraft during waterfowl season in the lagoon
- Exception for emergency and when permitted by State and USFWS
- Grant Point boat launch—about 10 launches per month outside of the waterfowl season
- During the waterfowl season there are about 1-2 launches per day plus FWS staff use

**King Cove**

**September 23, 2004**

- The Fish and Wildlife Service should allow a road to be built from King Cove to Cold Bay for safety reasons (Access to Cold Bay's all weather airport).
- Some people from King Cove hunt for caribou on the lands around Pavlof Bay.

## **Sand Point**

**September 24, 2004**

- There are more bears on Unimak Island than you think.
- Sand Point residents hunt around Pavlof Bay
- People probably didn't realize that the Izembek Refuge includes lands on the peninsula that are part of Alaska Peninsula Refuge

# **Izembek State Game Refuge Management Planning**

## **Izembek National Wildlife Refuge Comprehensive Conservation Planning**

### **Nelson Lagoon Public Scoping Meeting**

**October 20, 2004**

~ ~ DRAFT ~ ~

Pat Gonzales, Deputy Manager, Izembek National Wildlife Refuge, and Janet Hall Schempf, Special Area Planning Coordinator, Alaska Department of Fish and Game, traveled to Nelson Lagoon to meet with Nelson Lagoon residents affected by management of Izembek State Game Refuge and the Izembek National Wildlife Refuge planning area.

Scoping meeting attendees support development, but stressed that development needs “control” and local involvement. The general theme of the comments was “If approached in the right manner, it’s a doable thing, but we need the tools in place and the right people to make it work.”

Meeting attendees had also attended the September 20, 2004 meeting hosted by the Aleutians East Borough concerning possible oil and gas exploration and development in the area, and because the two meetings were similar, we were advised to read the meeting notes from the September 20 meeting. A summary of that meeting, by Aleutians East Borough Consultant Glenn Gray, is attached.

The October 20, 2004 discussion highlighted these general topics and concepts:

### **INCREASING HUMAN ACTIVITY**

- ATV traffic
- Increasing human presence
- Oil and gas development provides opportunity to make money but could compromise fish and wildlife resources
- Need to plan for more human uses, more competing uses.
- How much more can this system take without hitting its saturation point – guides are already maximizing their use, hard to put anyone else into it. (Pat mentioned no more expansion until 2008.)

### **NEED FOR LAND USE REGULATION**

- Weakening of the state and local coastal management programs
- Need tools to manage human presence: Need to make up our mind early what our saturation point is. We may be at saturation point now – state, local, and federal plans provide for development now . . . We need to be proactive to plan for the impacts. Our resources are limited.
- Black Hills to Cape Seniavin will be focus area for potential oil and gas.
- What kind of tools will we put into an overall plan of oil and gas development that is useful to state, fed, and local governments.



- A diverse committee – borough, state, local communities, federal government representation – should be established as an oversight committee.
- Lots of beautiful birds that have been here for millions of years, and the people here have protected them...
- Local people are the best shepherds... refuge management was one-sided, it was the government's refuge and there was not communication between the refuge and the communities. About 10 years ago, the communication changed. The coastal zone management plan was a combined dialogue between parties.
- The Federal Subsistence Board helped with communication between the communities and the FWS also.
- Lots of mistrust left over from the past, when nothing belonged to the people. It was this way up and down the coast.

## **HUNTING AND HUNTERS**

- Outside hunters are shooting caribou – 8 guys with big racks, send meat up after it is rotten. They are supposed to send it up fresh.
- Guides do just enough to get by the wanton waste law but still have an unusable product. Butch said he tried to have a regulation based on weight, but late rut meat isn't good for much besides spicy sausage.
- If you are a guide and it is caribou season you should be limited in the number of people you have. She gave an example of one guide with 30 clients and the sheer number is disruptive to the local communities.
- Meat is often good, but they hold it for so long.
- After September 15 the meat is "starting to go bad." The bull – cow ratio is high, so people can take a lot of bulls. The herd is small here, he explained, and they move up and down the peninsula. Walk across the ice to get around the mountain that might otherwise be a barrier.
- Two operators to six operators in the State Game Refuge... How did these people get permitted? What was the process? Six operators now out of Cold Bay.

## **RESOURCE / ECONOMIC DEVELOPMENT**

- Potential for development but locals should "be the first one in the door" for local control.
- Want local control of whatever is going on.
- Oil companies were here this fall, talking to people casually.
- We saw what happened in the 70s and 80s when wildlife management was poor, and there was a five-caribou limit, and Reeves had a winter special for hunters. Lots of wolves, lots of caribou hunted. Took a long time to rebuild, but now we see this starting to happen again.
- Local government needs to be strong, stay within the parameters of the law...

- All the levels of government need to be “talking from the same sheet of music.” State and feds need to work with locals to keep control. Need a strong partnership of all parties...
- What is the status of the King Cove hovercraft and the Cold Bay – King Cove road? How do these transportation links affect state and national refuge planning?
- The attendees support development, but development needs “control” and local involvement. For example, the outfall for the local fish processing facility. The facility, when operational, may double the population of Nelson Lagoon. So all the infrastructure for the last ten years has been geared towards this.
- Approach it in the right manner, and it’s a doable thing, but need the tools in place and the right people to make it work.

## **LONG TERM PROTECTION OF VALUABLE LANDS**

- The Bristol Bay Area Plan includes disposable lands; another attendee said these lands are obligated to the Boroughs.
- Disposable lands in the Port Moller area should be picked up by FWS. This would provide some protection, instead of privately owned and developed. These areas include Cape Seniavin.

## **ECOTOURISM**

- Need some diversification. Ecotourism needs regulating just like anything else.

**Attachment to Nelson Lagoon Izembek Refuge Public Meeting**

**Possible Oil and Gas Exploration and Development  
in the Aleutians East Borough (AEB)**

**Nelson Lagoon  
COMMUNITY MEETING  
September 20, 2004**

**Meeting Summary**

**Attendees**

Paul (Butch) Gunderson (President Nelson Lagoon Corporation)

Ray Johnson (Tribal President; Secretary and Treasurer of Nelson Lagoon Corporation)

Theo Chesley

Arlene Nelson

Sharon Brandell

Tina Anderson

Mark McNeley

Stanley Mack

John Nelson, Sr.

Sharon Boyette (AEB) [aeboro@gci.net](mailto:aeboro@gci.net)

Dale M. Gundersen

Meryle Brandell

Danny Johnson

Gordon

Glenn Gray (Glenn Gray and Associates) [Glenn@glennggray.net](mailto:Glenn@glennggray.net)

Susan Harvey (Environmental Solutions) [Sharvey@mtaonline.net](mailto:Sharvey@mtaonline.net)

## **INTRODUCTIONS**

Sharon Boyette (AEB) introduced Glenn Gray and Susan Harvey, the contractors assisting the borough prepare for upcoming oil and gas activities. Each person introduced themselves and made initial comments. Most of the meeting participants have lived all or most their lives in Nelson Lagoon.

## **COMMENTS**

The comments made during the introductions and throughout the meeting are summarized below by topic.

### **GENERAL COMMENTS**

Mayor Mack said that it was important for members of the community to make themselves heard throughout the review process --the community should set the ground rules. He said that years ago representatives from the Shetland Islands came to the AEB to provide advice about oil and gas development. They said, "If you don't stand up and tell them what you want, they'll come in and tell you what you'll get." He recommended the community set ground rules for issues that are important to them, so industry can play by the community's rules.

Butch Gunderson and John Nelson Sr. discussed how they were involved in earlier oil and gas exploration projects in the area, beginning in the 1960s. Ray Johnson said he knows where all of the wells are located. Several of the residents were employed on the oil rigs as roughnecks. There was concern expressed that the state and federal agencies let the oil companies operate with little requirements or restrictions, and they didn't clean up the sites. This time oil and gas development should be better regulated and should be required to clean-up before they leave.

### **POTENTIAL ECONOMIC BENEFITS**

Most of the speakers thought oil and gas development would be positive for the community as long as local resources and uses were protected, especially fishing.

- Employment opportunities would be welcomed especially in the winter (fishing season generally occurs early June--late August or early September).
- Would like a strong local hire program. The Alaska Works Partnership process for local hire used on the King Cove road project worked very well, and should be considered as a model.
- Residents welcome opportunities to participate in training to prepare for oil and gas jobs.
- Don't want oil and gas development to by-pass the community of Nelson Lagoon; they would like to be involved and benefit by providing services and by providing employees.
- There is a lot of talent in the villages.
- Companies could use Nelson Lagoon as a staging area.
- The community would like to build on the benefit of resources too (e.g. a natural gas spur line to Nelson Lagoon would reduce local fuel costs).

## **ECONOMIC DEVELOPMENT ISSUES**

- Due to low fish prices, there is a need to expand the economy.
- Most often dollars flow out of region rather than into it.
- Development could lead to a “boom and bust” economy where it may be difficult to “feed the monster” that is created.

## **FISHERIES AND OTHER RENEWABLE RESOURCES**

The meeting participants explained the importance of maintaining healthy fish populations to sustain local commercial and subsistence fishing.

- Renewable resources, such as salmon, deserve all the protections possible and should not be sacrificed to exploit a nonrenewable resource such as oil.
- Oil and gas activities should not interfere with fishing.
- Nelson Lagoon depends on salmon fishing (other communities have other fisheries).
- Important subsistence resources: salmon, waterfowl and caribou.
- “Ensure that our children have the opportunity to fish in the future.”
- At certain times of the year, 80% of the world’s population of threatened Steller Eiders may be in the area.
- Emperor geese inhabit the area.
- Port Moller and Herendeen Bay are the only areas in the lower Alaska Peninsula where sea otters populations are increasing.
- Some concern was expressed about the federal resource agencies “getting too riled up” and shutting everything down. The residents see a balance can be achieved between oil and gas development, the community and natural resources; no need for a “no development approach.”
- The low price of fish in recent years makes it difficult to make a living.

## **INCLUSION OF LOCAL RESIDENTS IN THE DECISION MAKING PROCESS**

- Participants agreed that all parties should be included in discussions.
- Round table discussion seldom occur; participants at this meeting enjoy this approach.
- Projects often happen without warning.
- One person noted that they usually hear about a project during the final stage of planning – meetings like this seldom occur.
- Residents recommended the idea of establishing “steering committees” in villages with liaisons to keep track of opportunities to comment.
- Local communities impacted by oil and gas development should have the “loudest voice.”

## **EFFECTS OF PRIOR OIL AND GAS ACTIVITIES IN THE AREA**

- Current regulatory protections were not in place during original exploration – residents of Nelson Lagoon saw what could happen without regulation.
- A number of former exploration sites in the region have abandoned barrels, which have still not been cleaned up. Residents have been working with the Alaska Department of Conservation to test sites and to begin planning to remove the materials. It would be more economical to use local residents to remove the materials than to hire an outside firm.

### **Issues of Concern and Mitigation Measures**

- Residents would like all drilling to be conducted from onshore locations, using directional drilling to reach offshore leases.
- Concerned that sea ice would make it too dangerous to drill offshore. If drilling must occur offshore, then gravel islands or drilling from natural islands is the only way it would be safe.
- One person said that it would be important to protect Native allotments such as ones in Herendeen Bay.
- Make sure the area stays the way it is.
- Need to fix loopholes in coastal zone management – lawyers looked at ability to influence projects.
- Projects should work for everyone – oil companies, the state, the borough and local residents.
- Residents reviewed examples of mitigation measures brought forth by other communities in Alaska. They liked the ideas of set-back requirements from lakes, and rivers, and limited drilling seasons to protect natural resources. Residents would like to review the examples and draft mitigation measures that are or could be applicable to Nelson Lagoon.

### **SUMMARY LIST DEVELOPED IDENTIFYING KEY ISSUES**

- Protect fish and fishing
- Protect all renewable resources
- Protect our way of life
- Local control/community wants to be involved in all aspects of development
- Local hire
- Do it right
- No offshore development
- Clean-up existing drum sites, and old oil and gas “messes”
- Boom-bust concerns
- Dismantlement, removal and restoration concerns
- Local business benefits
- Tax benefits to local communities

**Izembek National Wildlife Refuge: Comprehensive Conservation Planning  
and  
Izembek State Game Refuge: Management Planning**

**Public Scoping Meeting, Anchorage, May 19, 2005**

Meeting Summary by J. H. Schempf

Sandra Siekaniec and Maggi Arend led the Anchorage scoping meeting. Their presentations included an electronic slide presentation that would be useful for Izembek State Game Refuge planning team members and other interested parties. I gave a brief overview of the State Game Refuge, as some audience members had no prior knowledge of the State Game Refuge and its relationship to Izembek NWR.

Most of the discussion concerned increasing the economic viability of the area. These points were made by meeting participants:

- A lack of venues exist to support high value tourism in the NWR – infrastructure, such as cabins, is needed.
- Tourism infrastructure is lacking in the area. An interpretive center could be located in an existing community. The center would explain refuge lands and their values, and be accessible to ferry passengers.
- A “Capital Improvement Plan” for the Refuge should provide for economic stimulus to the local communities. (For example, FWS has a cooperative agreement with the City of Cold Bay to put audiovisual equipment in the Cold Bay community center.)
- National Wildlife Refuge land abuts the Cold Bay airport / crosswind runway. FAA has been rigid with the obstacle-free area and most buildings are affected. The crosswind runway could be moved away from the buildings so the buildings are outside the clear area.
- An update on the status of a land trade to enable a King Cove – Cold Bay road was requested. One meeting participant advised the assembled group that several formal discussions with the State have occurred and more will occur. The State will put together a proposal. Congressional action would be needed for a proposal to go forward.
- An update on the status of the road being built from King Cove to the Wilderness boundary was requested. One meeting participant reported that 6 miles were pioneered last summer (2004). At least some infrastructure for the hovercraft will be put into place during 2005. A terminal building at the Cold Bay airport may be constructed in 2006.
- The Aleutians East Borough envisions a “Hub Airport” for Cold Bay. Included would be cold storage capability for fish from King Cove and other communities awaiting airfreight.
- Sustainable economic activity is desired.

- FWS should provide support for wilderness users and wilderness commercial users (for example, brochures and maps).
- FWS should provide educational / outreach materials for Wilderness users.
- The M/V Tustumena will visit Cold Bay twice a month. The Cold Bay stop was extended so folks can go on the popular FWS “tour” to Grant Point.
- The peak for waterfowl, caribou, and bear hunting is August – October.
- The Russell Creek fish hatchery has been purchased by folks who want to provide fishing access for handicapped fishermen.
- Life-list birders can see most of the Izembek birds elsewhere and for less expense. However, some birdwatchers do take the M/V Tustumena to Cold Bay for the adventure and the chance opportunity of sighting a bird that is unusual to them. Birdwatchers also visit for the photographic opportunities.
- Camping sites are needed. Sites should have food caches, toilet facilities, and potable water.
- Public comments during the Cold Bay scoping meeting indicated a desire to keep improvements simple to maintain the existing character of the community: e.g., provide road pullouts with no pavement.
- A question was asked about ATV use, and Sandra provided an overview. The Service evaluated traditional (pre-ANILCA) use of ORV’s for the 1985 CCP and determined that the use occurred on existing roads, so ORV use was limited to existing roads and trails. The area currently proposed for closure is very steep and the Service recently determined the area did not have traditional ORV use. The Service plans to continue the evaluation of traditional access and activities for other areas.
- A question was asked about the status of Outpost Road. Sandra explained that it is not an approved road, but that the road will be evaluated in this plan. Wilderness lands lie just beyond Pintail Lake. All improvements to the road have been outside Wilderness.
- A participant asked about climate change and monitoring changes in the eelgrass beds. The speaker went on to say the FWS and ADF&G response to climate change should be monitoring to determine the rate of change and to introduce any mitigating measures. Sea level change and effects on eelgrass and the barrier islands should be monitored. Ocean buoys with monitoring equipment would be installed and maintained.



**Meeting participants included:**

Allen Kemplen, DOT, Area Planner

Brad Palach, ADF&G, Division of Wildlife Conservation

Sue Magee, State ANILCA Coordination Office

Michael Baffrey, Department of the Interior, Office of the Secretary

Dirk Dirksen, USGS, Alaska Science Center, Supervisory Wildlife Biologist

Todd Logan, FWS, Chief of Refuges

Mike Boylan, FWS, Refuge Supervisor, Southern Alaska

Danielle Jerry, FWS, Division of Natural Resources

Pete Wikoff, FWS, planner

Alex Marban, Alaska Newspapers, Inc., reporter

Richard Guthrie, permittee

Dave Goggins, TelAlaska, Inc., BP Operations

Jack Hession, Sierra Club

Gerald L. Clauson, FWS, volunteer; Friends of Alaska Refuges; and retired FWS Refuge Manager

Thanks are extended to Maggi Arnend, Sandra Siekaniec, and Susan Magee for their review of these notes.

## Scoping Comments: Mail-in Comment Sheets

Issue or Concern	FWS National Wildlife Refuge CCP	ADF&G SGR management plan	Not Relevant to NWR or SGR planning
<b>ACCESS</b>			
1. Maintaining access for non-commercial sport hunting and fishing. Overpopulation of visitors a concern.	Yes	Yes	
6. Maintain the status quo regarding access!	Yes	Yes	
10. Limit the number of people who can visit the area each week. Too many visitors can ruin the area you are trying to preserve. (Human carrying capacity; Wolverine creek implementation)			
13. Item 4 and 5, include improved access roads and other means for the physically challenged or disabled, and for subsistence and sportsmen and other means for subsistence and sportsmen and	Yes	Yes	
13. item 6, Show all RS 2477...	Yes	No	
13. item 9	Yes	Yes	
<b>PROTECTION</b>			
1. I am confident you will protect the resources if possible – we don't need a Pebble Mine our there! Strong protection in every sense of the word			
Protect endangered species	Yes	Yes	
5. Preserve the wilderness character			
7. Protect and conserve the INWR to the maximum extent possible! Do not allow timber, mining, or other commercial interests to expand. Instead			
9. Protect of habitat and the animals that use it, including wolves and bears.	Yes	Yes	
10. Concerned about oil and mineral exploration.			
14. I appreciate your focus on protecting wildlife and their habitats			
14. Protect and patrol this beautiful refuge			
<b>ENDANGERED SPECIES</b>			
2. Protect endangered species			

-continued-

Issue or Concern	FWS National Wildlife Refuge CCP	ADF&G SGR management plan	Not Relevant to NWR or SGR planning
<b>HUNTING, FISHING, TRAPPING</b>			
2. I do not want the refuge turned into a shooting preserve like so many others have			
2. I do not want it exploited and...			
2. If sport hunting and trapping are there, then the true mission of the Refuge and values are not being met.			
2. To turn refuges into shooting preserves, to strip log, strip mine, etc., is truly a crime against nature. Preserve it as nature sanctuary			
6. Establish a brown bear viewing area, closed to hunting.			
8. I am concerned that human interests of negative types (hunting, fishing, trapping, etc.) will expand to our refuges. There should be none of that on national refuges which are supposed to be			
9. Encourage the Alaska Fish and Game Dept to stop wonton killing of wolves.			
14. Limit exploitive uses (hunting, trapping, fishing). Aerial hunting, of course, should be entirely banned. Keep solitude quality protected and intact.			
16. Wants no hunting and fishing.			
<b>OIL &amp; GAS</b>			
13. Ensure that only the minimum necessary level of restriction....			
<b>AGENCY COORDINATION</b>			
3. Our interest is any activities that fall under Section 10 of the Rivers and Harbors Act or Section 404 of the Clean Water Act.			
3. Please notify the Corps prior to conducting any work within our jurisdiction, the waters of the US.			
5. FWS, not ADF&G, is the managing agency....			
11. We request that the Service identify and clarify the state's role and involvement in the CCP process. We also would like the Service to clarify the role it has played in the SGR planning process, and clarify the relationship between the two refuges.	Yes	Yes	

-continued-

Issue or Concern	FWS National Wildlife Refuge CCP	ADF&G SGR management plan	Not Relevant to NWR or SGR planning
<b>KING COVE ROAD</b>			
6. Of greatest concern is a possible road to King Cove. They are presently being protected by, may be threatened by, a road to King Cove in the future.			
15. Please no road building – use money on upgrade medical...			
<b>VALUES</b>			
1. Remote			
1. Not heavily used			
1. Currently well protected by distance and lack of commercial interests.			
2. I value the natural diversity of life.2. If sport hunting and trapping are there, then the true mission of the Refuge and values are not being met.			
2. I was brought up to love and respect the Earth and all the life it has			
2. To turn Refuges into shooting preserves, to strip log, strip mine, etc., is truly a crime against nature. San Francisco letter – Wilderness only			
5. Wilderness character of the area			
6. Wildlife and wilderness. They are presently being protected by may be threatened by a road to King Cove in the future.			
9. The natural habitat and the wildlife; salmon			
10. The scenery, and all the wildlife and vegetation in the area			
14. Solitude, but most importantly the Refuge as a home for wildlife that is an awesome thing that draws me back to Alaska year after year.			
15.			
<b>OTHER</b>			
6. Establish a brown bear viewing area, closed to hunting.	No	No	
13. Effectively consider the economic needs of Alaska	No	No (DNR does this with the O&G plan)	
13. Item 3, additional Wilderness	Yes	No	
13. Item 8, utility lines and pipelines, etc.	Yes	Yes	
14. Your parks and refuges are some of the most beautiful in the world – protect and treasure them!			

-continued-

Issue or Concern	FWS National Wildlife Refuge CCP	ADF&G SGR management plan	Not Relevant to NWR or SGR planning
<b>AIRCRAFT OVERFLIGHTS</b>			
13. Item 7, the plan should allow private helicopter and fixed wing flights, subject to nesting restrictions, etc. Current prohibitions against these activities should be removed.	Yes	Yes	
<b>MANAGEMENT PLAN IMPLEMENTATION</b>			
Protect and patrol this beautiful refuge.			
14. Educate visitors, especially regarding non-exploitive experiences in the refuge. Climate change, eelgrass bed monitoring			
<b>CARRYING CAPACITY</b>			
2. Over population of visitors a concern			
14. Animal habitats do need active protection, especially as human pressure to enjoy an area grows.			
<b>TO DO IN Plan Introduction / Background</b>			
1. The term refuge does not mean sanctuary	Y	Y	
2. Issues that will not be addressed in the plan	Y	Y	
King Cove Road			
Game Board topics			
3. Commercial operators in the SGR			
Explain how people become guides, how many there are, where they operate			
Big game guides			
Waterfowl guides			
4. Support for monitoring the eelgrass beds			
Tie to plan goals. To brant and other waterfowl			
Boat launch ramp at Grant Point – low key development, if any			
No channel dredging			
Don't improve the road to the boat launch ramp			



**APPENDIX C**  
**SCOPING QUESTIONNAIRE**





**Izembek National Wildlife Refuge Plan Revision  
Comments on Comprehensive Plan Revision**

*We are asking for your help in developing the list of issues to be addressed in the plan. You can use this form for your response if you choose. You can fax your comments to (907)786-3965 or email them to [fw7\\_izembek\\_planning@fws.gov](mailto:fw7_izembek_planning@fws.gov). To be most useful, please send us your comments by **July 1, 2005**. Thanks for your help!*

1. What are your concerns and interests about the future of the Izembek refuge (including Unimak Island and the North Creek and Pavlof units of Alaska Maritime refuge)? Are there other topics you feel we should consider?

2. What actions would you like to see us consider taking to address the issues, or to deal with other concerns you have about the refuge?

3. Finally, what is it about the refuge and its resources that you value the most? Are these values being protected or do you feel they are threatened?

Do you have any other comments?

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Please fold on the lines, tape, and mail

*The mission of the National Wildlife Refuge System is: "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans." (Refuge Improvement Act, 1997)*

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Maggi Arend, Team Leader  
U.S. Fish and Wildlife Service  
Refuge Planning, MS-231  
1011 E. Tudor Rd.  
Anchorage AK 99503

**APPENDIX D**  
**ADF&G SPECIAL AREA REGULATIONS**



## **Appendix D**

### **ADF&G SPECIAL AREA REGULATIONS**

Title 5 Alaska Administrative Code  
Part 5, Protection of Fish and Game Habitat

Chapter 95, Fish and Game Habitat  
Articles 4, 7, and 8

Article 4. Special Areas (5 AAC 95.400 – 5 AAC 95.440)

Article 7. Permit Procedures (5 AAC 95.700 – 5 AAC 95.770)

Article 8. General Provisions (5 AAC 95.900 – 5 AAC 95.990)

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**Note to Readers:** As of Register 148, January 1999, textual cross-references and authority citations to the following statutes were changed as follows, to reflect renumbering of those statutes by the Revisor of Statutes: AS 16.20.120 was renumbered AS 16.20.094; AS 16.20.130 was renumbered AS 16.20.096; AS 16.20.170 was renumbered AS 16.20.162; AS 16.20.250 was renumbered AS 16.20.520; and AS 16.20.260 was renumbered AS 16.20.530.

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**This chapter is implemented by the Alaska Department of Fish and Game, Division of Habitat.**

**Points of contact in the Division of Habitat are:**

**Juneau (Douglas)**

802 3<sup>rd</sup> Street, Juneau, Alaska 99824-5412; telephone: 907-465-4105

**Anchorage**

333 Raspberry Road, Anchorage, Alaska 99518-1565; telephone: 907-267-2342

**Fairbanks**

1300 College Road, Fairbanks, Alaska 99701-1551; telephone: 907-459-7289

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~~~~~This material is not an official copy of these regulations. ~~~~~

## Article 4. Special Areas

### Section

- 400. Implementation of authority
- 410. Notice requirements
- 420. Activities requiring a special area permit
- 430. Conditioning, approval, or denial of special area permits
- 440. Limitations on special area permits

**5 AAC 95.400. Implementation of authority.** The commissioner will implement the authorities vested in AS16.20.050, 16.20.060, 16.20.094, 16.20.162, 16.20.520, and 16.20.530, excluding hunting, trapping, and fishing, in accordance with procedures established in this chapter. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.060 |
|                   | AS 16.05.050 | AS 16.20.094 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.520 |
|                   | AS 16.05.270 | AS 16.20.530 |
|                   | AS 16.20.050 |              |

**5 AAC 95.410. Notice requirements.** (a) Before a lease or other disposal of land under state jurisdiction and control in a special area, or private land in a critical habitat area, the responsible state department or agency or private landowner shall notify the commissioner.

(b) No person or governmental agency may undertake an activity listed in 5 AAC 95.420(a) within a special area unless the commissioner has been notified and a permit for the activity has been issued by the commissioner under 5 AAC 95.700 - 5 AAC 95.760. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.520 |
|                   | AS 16.20.050 |              |

**5 AAC 95.420. Activities requiring a special area permit.** (a) No person or governmental agency may engage in the following uses or activities within a special area without first obtaining a special area permit following the procedures of 5 AAC 95.700 - 5 AAC 95.760:

(1) construction, placement, or continuing use of any improvement, structure, or real property within a special area;

- (2) destruction of vegetation;
  - (3) detonation of an explosive other than a firearm;
  - (4) excavation, surface or shoreline altering activity, dredging, filling, draining, or flooding;
  - (5) natural resource or energy exploration, development, production, or associated activities;
  - (6) water diversion or withdrawal;
  - (7) off-road use of wheeled or tracked equipment unless the commissioner has issued a general permit under 5 AAC 95.770;
  - (8) waste disposal, placement, or use of a toxic substance;
  - (9) grazing or animal husbandry; and
  - (10) any other activity that is likely to have a significant effect on vegetation, drainage, water quality, soil stability, fish, wildlife, or their habitat, or which disturbs fish or wildlife other than lawful hunting, trapping, fishing, viewing, and photography.
- (b) The commissioner makes the final determination as to whether a specific activity is subject to the provisions of this chapter. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.430. Conditioning, approval, or denial of special area permits.** If the procedural requirements of 5 AAC 95.700 - 5 AAC 95.760 are met, the commissioner will permit a use or activity listed in 5 AAC 95.420 that meets or can be conditioned to meet the following standards:

- (1) the use or activity is consistent with the protection of fish and wildlife and their use, protection of fish and wildlife habitat, and the purpose for which the special area was established; and
- (2) the use or activity does not unduly restrict or interfere with the public use and enjoyment of the resource values for which the special area was established; and

(3) any adverse effect upon fish and wildlife, and their habitats, and any restriction or interference with public use, is mitigated in accordance with 5 AAC 95.900. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.440. Limitations on special area permits.** A permit issued under 5 AAC 95.700 - 5 AAC 95-760.

(1) does not convey an interest in state land or grant any preference right for the lease or purchase of state land; and

(2) does not allow the permittee to restrict or interfere with public access across or public use of a special area unless specified in the permit. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |



## **Article 7. Permit Procedures**

### **Section**

- 700. Application procedures
- 710. Permit decision
- 720. Permit conditions and assignments
- 730. Permit term
- 740. Amendments to the permit
- 750. Retention of permit; inspection of permit sites
- 760. Renewal of permit
- 770. General permits

**5 AAC 95.700. Application procedures.** (a) An applicant for a permit shall submit a completed application on a form or in a manner approved by the commissioner. The application must be correct and complete to the best of the applicant's knowledge and be signed and dated by the applicant or the applicant's designee. The submission of a completed application satisfies any related notification required by AS 16 and this chapter. An application form is available from the department's habitat division offices.

(b) The completed application must include the anticipated commencement date, duration, and area of proposed activity including a scaled map, identification of waterbodies at the site, description of type of activity, description of any proposed facility, the description of proposed access route and means and time of travel, and other information necessary for the commissioner to determine whether the activity will comply with the applicable provisions of this chapter.

(c) A completed application must be submitted to the department's habitat division office representing the region or area in which the proposed activity will occur. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.520 |
|                   | AS 16.20.050 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.710. Permit decision.** (a) The commissioner will issue a permit if the commissioner determines that the requirements of this chapter are met.

(b) The commissioner will notify an applicant in writing of any denial. The notice will include

- (1) the reason for the denial; and

(2) a statement that the applicant may appeal under 5 AAC 95.920 or submit new or additional information and ask for reconsideration under (c) of this section.

(c) The commissioner may reconsider a denial of an application if the applicant submits factual information which is new or additional to that supplied with the original application. An applicant may submit the new or additional information as an amendment to the original application, or the applicant may submit a new application. The procedures of 5 AAC 95.700 - 5 AAC 95.760 apply to reconsideration. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.520 |
|                   | AS 16.20.050 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.720. Permit conditions and assignment.** (a) To provide for the proper protection and management of fish and wildlife, and their habitats, the commissioner may include as conditions of the permit

(1) the duration of the proposed activity, including any provision for changing the time period during which the permit is valid and any provision for changing the effective time period of the permit;

(2) any other seasonal use restrictions on a specific activity;

(3) limitation of the a real extent of the activity;

(4) any provision for the mitigation of damage to fish or wildlife, or their habitats;

(5) any provision to facilitate periodic monitoring of the proposed land or water use or activity by an authorized representative of the state, including inspection and sampling;

(6) reporting requirements;

(7) any provision for the posting of a performance bond or other surety as authorized in 5 AAC 95.950.necessary to ensure compliance with the provisions of this chapter or conditions of the permit; and

(8) any other necessary condition.

(b) A permit may not be transferred but may be assigned upon written consent by the commissioner.

(c) The commissioner may require a permit applicant to sign and date the permit before its validation as acknowledgement of the permittee's agreement to, and full understanding of, all conditions of the permit.

(d) A person who obtains a permit issued under this chapter must comply with all conditions set out in the permit. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.730. Permit term.** (a) Except as provided in (b) and (c) of this section, the commissioner may issue a permit for a fixed term not to exceed two years, subject to the provisions of this chapter.

(b) The commissioner may issue a permit for a personal use cabin, concurrent with a permit issued by the Department of Natural Resources under 11 AAC 65, for up to six years.

(c) The commissioner may issue a permit for a fixed term exceeding two years if the commissioner determines that the activity meets the purposes and requirements of this chapter and the activity is permanent in nature. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.740. Amendments to the permit.** (a) The commissioner may initiate action to amend a permit to correct any condition or change any method authorized by the permit which was reasonably unforeseeable at the time of permit approval and which threatens to cause a substantially adverse effect upon

(1) fish or wildlife, or their habitat; or

(2) if the permit is a special area permit, the purpose for which the special area was established.

(b) Any action a permittee desires to take which increases the overall scope of the project or which negates, alters, or minimizes the intent or effectiveness of any condition

contained in a permit, is a deviation from the approved plan and requires an amendment before initiation of the action.

(c) A permittee may request amendment of a permit by submitting, to the department's habitat division office where the permit was issued, a written statement explaining why the amendment is necessary, including the amended plan, the location, commencement time, duration, and type of activity requiring amendment.

(d) The commissioner will issue an amendment to the permit if he or she determines that the requirements of this chapter will be met. Review of a request for amendment after receipt of the written statement in the appropriate habitat division office will not exceed 30 days. The procedures of 5 AAC 95.700 - 5 AAC 95.760 apply to a request for amendment.

(e) An amendment approved by the commissioner becomes effective upon receipt by the permittee, or at a later date specified by the amendment. An amendment is valid for the duration of the permit or for a shorter specified period. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.750. Retention of permit; inspection of permit sites.** (a) A permittee shall keep a copy of the permit, including any amendments, at the site of the permitted activity until completion of the activity, and shall make it available for inspection upon request by an authorized representative of the state.

(b) For the purpose of inspecting or monitoring compliance with any condition of the permit or the requirements of this chapter, a permittee shall give an authorized representative of the state free and unobstructed access, at safe and reasonable times, to the permit site. A permittee shall furnish whatever assistance and information as the authorized representative reasonably requires for monitoring and inspection purposes. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.760. Renewal of permit.** (a) A permittee may request renewal of an existing permit before the expiration of the current term of the permit. Procedures in this chapter

apply to renewal, except that the filing of a new application under 5 AAC 95.700 is not required.

(b) If an existing permit expires or is revoked, a permittee may obtain a new permit only by filing a new completed application in accordance with 5 AAC 95.700. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.770. General permits.** Notwithstanding the provisions of 5 AAC 95.700 and 5 AAC 95.750 - 5 AAC 95.760, the commissioner may issue a permit to the public at large for a specific activity in a specific area. (Eff. 6/5/86, Register 98; am 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

## **Article 8.**

### **General Provisions**

#### **Section**

900. Mitigation of damages.  
910. Failure to adhere to standards.  
920. Appeals.  
930. Exclusion periods.  
940. Exemption for emergency and police power activities.  
950. Bonding or security.  
990. Definitions.

**5 AAC 95.900. Mitigation of damages.** (a) Each permittee shall mitigate any adverse effect upon fish or wildlife, or their habitat, which the commissioner determines may be expected to result from, or which actually results from, the permittee's activity, or which was a direct result of the permittee's failure to

(1) comply with a permit condition or a provision of this chapter; or

(2) correct a condition or change a method foreseeably detrimental to fish or wildlife, or their habitat.

(b) Mitigation techniques must be employed in the following order of priority:

(1) avoid an impact altogether by not taking a certain action or parts of an action;

(2) minimize an impact by limiting the degree of magnitude of the action;

(3) rectify the impact by repairing, rehabilitating, or restoring the affected environment;

(4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action;

(5) compensate for the impact by replacing or providing substitute resources or environments.

(c) The duty to mitigate in (a) of this section does not apply to unavoidable adverse effects upon fish or wildlife populations, or their habitat, arising from an overwhelming force of nature with consequences not preventable by due and reasonable precautions.

(d) The commissioner will, in his or her discretion, specify, by permit amendment, additional provisions for mitigating damage to fish and wildlife populations, and their habitat.

(e) Notwithstanding the expiration or revocation of a permit, a permittee is responsible for the obligations arising under the terms and conditions of the permit, and under the provisions of this chapter. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.902. Liability for violations.** A person who violates a provision of this chapter is strictly liable for the offense, regardless of that person's intent. (Eff. 8/15/2008, Register 187)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.520 |
|                   | AS 16.20.050 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.910. Failure to adhere to standards.** The commissioner will in his or her discretion require in writing that a permittee correct a condition or remove a structure or installation constructed under permit by the permittee, which is not in accordance with a provision of the permit. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.920. Appeals.** An interested person may initiate an appeal of a decision made under this chapter in accordance with the provisions of AS 44.62.330 - 44.62.630 by requesting a hearing under AS 44.62.370. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.930. Exclusion periods.** (a) The commissioner will notify a permittee that the term of the permit is, or will be, interrupted for a period of time if the commissioner determines that

(1) a temporary environmental condition exists which was reasonably unforeseeable at the time of permit approval and the permitted activity, if allowed to continue, threatens to cause a substantial adverse impact;

(2) the permittee has failed to implement a required mitigating or preventative measure; or

(3) the permittee has failed to comply with a provision of this chapter, or a condition of the permit.

(b) The exclusion period established under (a) of this section will be as long as necessary for abatement of the temporary condition, completion of the required mitigating or preventive measure, or compliance with the permit condition or the provisions of this chapter, and will not exceed a total of 30 days in any calendar year, without the consent of the permittee.

(c) The commissioner will, by notice to the permittee, terminate an exclusion period after the permittee demonstrates abatement, compliance, or implementation of the required mitigating measures.

(d) If the commissioner finds, before or during an exclusion period, that corrective action is unlikely to be completed within any available exclusion period, the commissioner will, in his or her discretion, initiate a revocation proceeding under AS 44.62.330 – AS 44.62.630. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.940. Exemption for emergency and police power activities.** In an emergency, the commissioner may issue an oral permit for emergency or police power activities before receiving the completed application required in 5 AAC 95.700. A completed application must be submitted within the time specified by the commissioner, whether before or after the emergency or police power activity takes place. (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.950. Bonding or security.** (a) The commissioner will, in his or her discretion, require a performance bond with a surety company authorized to transact



business in Alaska, or other specified security to secure the performance of the terms and conditions of a permit issued under this chapter.

(b) A performance bond or security required under (a) of this section is limited to an amount reasonably necessary to ensure compliance with the provisions of this chapter or the terms and conditions of a permit issued under this chapter.

(c) The commissioner will inspect or review actions taken under each applicable term or condition of a permit issued under this chapter, and will make a written finding that each applicable term and condition of the permit has been completed, before the permittee's performance bond or security is released.

(d) The posting of a performance bond or the taking of other security under (a) of this section does not limit the department's right, under applicable law, to seek further compensation from the permittee for actual damages to fish or wildlife, or their habitats, or for a violation of the permit. (6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.520 |
|                   | AS 16.20.050 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**5 AAC 95.990. Definitions.** In addition to the definitions set out in AS 16.05.940, as used in this chapter:

(1) “authorized representative of the state” means one who is legally empowered to enforce a statute under which regulations in this chapter are promulgated;

(2) “completed application” means the submission of full plans, specifications and notifications required by AS 16.20, and includes a form, series of forms, letter or other documents that provide all of the information necessary for the commissioner to issue, condition or deny a permit;

(3) “emergency” means an unforeseeable situation that presents an imminent threat to life or property;

(4) “mitigate” means to compensate fully for damage to fish and wildlife populations and their habitat by employing the most appropriate techniques;

(5) “permittee” means the holder of a permit and includes anyone employed, contracted, or assigned by the person or the organization to whom the permit was issued to conduct a land or water use operation;

(6) “permit” means the approval of plans and specifications required by AS 16.20.060 or 16.20.530, and any authorization made under AS 16.20.094, 16.20.096, or 16.20.162;

(7) “special area” means a state game refuge, a state game sanctuary, or a state fish and game critical habitat area, established under AS 16.20;

(8) “wildlife” means any species of bird or mammal as described in AS 16.05.940 (14). (Eff. 6/5/86, Register 98)

|                   |              |              |
|-------------------|--------------|--------------|
| <b>Authority:</b> | AS 16.05.020 | AS 16.20.094 |
|                   | AS 16.05.050 | AS 16.20.096 |
|                   | AS 16.05.251 | AS 16.20.162 |
|                   | AS 16.05.255 | AS 16.20.530 |
|                   | AS 16.20.060 |              |

**APPENDIX E**  
**ADF&G – USFWS SUPPLEMENTAL MOU AND LIST OF**  
**STUDIES**



**Supplement to the Master Memorandum of Understanding**

**Supplemental Memorandum of Understanding** between FWS & ADF&G to assist the agencies in cooperatively managing the Izembek National Wildlife Refuge and the Izembek State Game Refuge pursuant to ANILCA and Title 16.

**Effective 12/22/86**

**Expires: Reassessed every 5 years**

SUPPLEMENT TO THE  
MASTER MEMORANDUM OF UNDERSTANDING  
Between the

U.S. FISH AND WILDLIFE SERVICE  
Anchorage, Alaska

and

THE ALASKA DEPARTMENT OF FISH AND GAME  
Juneau, Alaska

This Supplemental Memorandum of Understanding (MOU) is designed to assist the agencies in cooperatively managing the Izembek National Wildlife Refuge (NWR) and the Izembek State Game Refuge (SGR).

The United States Fish and Wildlife Service (Service) enters into this agreement pursuant to Section 304(f) of the Alaska National Interest Lands Conservation Act (ANILCA), Pub. L. No. 96-487, 94 Stat. 2371, 2394 (1980). The Alaska Department of Fish and Game (Department) enters into this agreement pursuant to Section 16.05.050(1) and 16.05.050(13) of Title 16, Alaska Statutes (1984).

WITNESSETH:

WHEREAS, there is in effect a Master Memorandum of Understanding between the Department and the Service which reflects the general policy guidelines within which the two agencies agree to operate;

WHEREAS, in that Master Memorandum of Understanding provision was made for supplemental MOU's to facilitate management policies; and

WHEREAS, the purpose in establishing the Izembek SGR (AS 16.20.020) is to protect and preserve the natural wildlife habitat and wildlife populations; and

WHEREAS, the purpose in establishing Izembek NWR [ANILCA S 303(3)] is to manage and conserve fish and wildlife populations and habitats in their natural diversity, and to provide the opportunity for continuation of subsistence uses by local rural residents; and

WHEREAS, The Bristol Bay Cooperative Land Use Plan Group, the Bristol Bay Area Plan, and the Bristol Bay Regional Management Plan recommend the formulation of a Cooperative Agreement for the management of the lagoon and surrounding federal lands; and

WHEREAS, certain waterfowl populations, particularly black brant and emperor geese, which depend upon Izembek Lagoon and adjacent marine waters and uplands have undergone serious declines.

NOW, THEREFORE, the parties hereto agree as follows:

THE DEPARTMENT AGREES:

1. To prepare and implement a refuge management plan and appropriate regulations for Izembek SGR which will protect and preserve the natural habitat and fish and wildlife populations within the boundaries as described in AS 16.20.030 and which is compatible, to the maximum extent allowable, with the intent and purposes of the Izembek NWR. The plan will provide for the continued harvest of fish and wildlife resources, including the opportunity for subsistence uses of wild, renewable resources by rural residents as provided for in Alaska law.
2. To review all proposed public and land use activities within Izembek SGR and authorize activities which are compatible with the conservation of fish and wildlife resources, habitats, and uses, as described in Title 16 of Alaska Statutes.
3. To conduct an active monitoring and enforcement program for land use activities authorized under AS 16.20.050-.060.
4. To review and comment on the Service's refuge plans, land use actions, and permits which affect Izembek SGR.
5. To permit the Service reasonable access to the Izembek SGR for purposes relating to the administration of the Izembek NWR.

THE SERVICE AGREES:

1. To assist the Department in monitoring land use activities within Izembek SGR and report any unauthorized activities promptly to the Department.
2. To prepare and implement a refuge management plan and appropriate regulations for Izembek NWR which provides that land use activities on the Izembek NWR are compatible, to the maximum extent allowable, with the purposes of the Izembek SGR.
3. To provide technical assistance to the Department during the development of a management plan for the Izembek SGR.
4. To review and comment on the Department's refuge plans, land use actions, and permits which affect Izembek NWR.
5. To continue present surveys and inventories of waterfowl populations and research on waterfowl usage of the Izembek state and federal refuges.
6. To provide the department and public reasonable access to Izembek NWR for purposes relating to the management and use of Izembek State Game Refuge.

## THE SERVICE AND THE DEPARTMENT MUTUALLY AGREE:

1. Nothing in this MOU shall obligate any party to the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.
2. Each party will be responsible only for its own acts and the results thereof; and will assume all risks and/or liabilities resulting from its individual actions.
3. No member of Congress, or Commissioner, shall be admitted to any share or part of the agreement or to any benefit that may arise therefrom.
4. Each party will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.
5. Nothing herein is intended to conflict with federal, state, or local laws or regulations. If there are conflicts, the laws and regulations shall have precedence. This agreement will be amended at the first opportunity to bring it into conformance with conflicting laws or regulations.
6. Either party may terminate its participation in this MOU by providing to the other party written notice 120 days prior to the effective date of termination.
7. A free exchange of research and assessment data between agencies is necessary to attain the management goals of the state and federal refuges.
8. To cooperate in conducting systematic surveys and inventories of fish and wildlife populations within the Izembek state and federal refuges.
9. To consult on the issuance, monitoring and enforcement of appropriate land use permits for activities on state and federal refuges.
10. To develop consultation procedures that are in compliance with the state permit reform regulations and appropriate federal regulations governing notice and review periods.
11. To permit land use activities consistent with the purposes described in AS 16.20.020 and Section 303(3) of ANILCA as outlined in the agencies' respective management plans and with agreements reached in the Bristol Bay Cooperative Planning Process and described in the State Bristol Bay Area Plan and Federal Bristol Bay Regional Management Plan.
12. To conduct cooperative research and studies on the effect of activities which may adversely affect waterfowl or other fish and wildlife populations.
13. Amendments to this agreement may be proposed by either agency and shall become effective upon approval of both agencies.



14. Both agencies agree to maintain regular contact pertaining to implementation of the MOU and to meet annually to discuss long-term direction and evaluation.
15. The effective date of this agreement shall be from the date of final signature.
16. This agreement is entered into under the conditions of the Master Memorandum of Understanding between the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service, dated March 13, 1982.
17. Contact points for coordination under this agreement are:

for the Service --

Refuge Manager, Izembek NWR

for the Department --

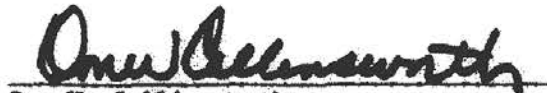
Deputy Commissioner



Robert E. Gilmore  
Regional Director  
U.S. Fish and Wildlife Service

DEC 22 1986

Date



Don W. Collinsworth  
Commissioner  
Alaska Department of Fish and Game

Date

10-27-86

Table E1.–Biological Surveys/Projects at Izembek NWR which include or may affect Izembek SGR in 2008.

**US Fish and Wildlife Service Surveys**

| <u>Aerial Survey/Inventory</u>           | <u>Timing</u>  | <u># Surveys/Year</u>       | <u>Connection to Izembek SGR</u>        |
|------------------------------------------|----------------|-----------------------------|-----------------------------------------|
| Aerial Mid-winter Brant Survey           | Dec to Feb     | 1-3                         | Survey over Izembek Lagoon              |
| Aerial Waterfowl Surveys - Winter        | Nov to May     | variable                    | Survey over Izembek Lagoon              |
| Aerial Tundra Swan Survey                | May-June       | 1                           | Adjacent to Izembek Lagoon              |
| Aerial Scoter/Scaup Survey               | June-July      | 2                           | Survey over Izembek Lagoon              |
| Aerial Brown Bear Stream Surveys         | Aug 20-Sept 5  | 2                           | Survey over Moffet Lagoon               |
| Steller's Eider Recon for banding        | Aug 20-Sept 23 | 1-3                         | Fly over Izembek Lagoon                 |
| Aerial Steller's Eider Molt Surveys      | Aug 20-Sept 31 | 1-3                         | Survey over Izembek Lagoon              |
| Aerial Waterfowl Surveys – Fall Staging  | Aug to Nov     | 3-6                         | Survey over Izembek Lagoon              |
| Caribou Telemetry flights                | Sept to Apr    | 1/month                     | Adjacent to Izembek Lagoon              |
| Aerial Caribou Survey of Lower Peninsula | Nov to Mar     | 1                           | Adjacent to Izembek Lagoon              |
| Aerial Caribou Survey of Unimak Island   | Nov to Apr     | 1                           | None                                    |
| Waterfowl/Shorebird Telemetry flights    | as needed      | as needed                   | Sometimes over Izembek Lagoon           |
| <u>Ground Survey/Inventory</u>           |                |                             |                                         |
| Breeding Bird Survey                     | 15-Jun         | 1                           | View Izembek Lagoon from shore          |
| Off-road Point Counts                    | June 5-25      | 50-75 points                | Potential access to some points by boat |
| COASST Beached Bird Surveys              | Apr-Nov        | 1/month                     | Boat to Izembek barrier islands         |
| Black Brant Production                   | Sept & Oct     | > 20,000 brant classified   | Boat in Lagoon/hike out to flats        |
| Emperor Goose Production                 | Sept & Oct     | > 2,000 emperors classified | Boat in Lagoon/hike out to flats        |
| Christmas Bird Count                     | Dec 20- Jan 5  | 1                           | View Izembek Lagoon from shore          |
| Waterfowl/Shorebird Telemetry            | as needed      | as needed                   | Boat in Lagoon/hike out to flats        |
| Berry Production Monitoring              | August         | 20 transects                | None                                    |

-continued-

Table E1.–Page 2 of 3.

| <u>Programs/Studies</u>                  | <u>Timing</u>    | <u># Surveys/Year</u>                            | <u>Connection to Izembek SGR</u>               |
|------------------------------------------|------------------|--------------------------------------------------|------------------------------------------------|
| Tundra Swan banding & AI Sampling        | July 15-Aug 15   | 75-100 birds captured                            | None                                           |
| Eelgrass biomass sampling                | August           | 3 weeks                                          | Sample points in Izembek Lagoon                |
| Eelgrass productivity sampling           | July-Oct         | 3 days/month                                     | Sample points near Grant Point                 |
| Eelgrass ecosystem monitoring – various  | year round       | physical sensors                                 | Sensors deployed near Grant Point              |
| Steller's Eider banding & AI Sampling    | Aug 25-Oct 5     | up to 2500 birds captured                        | Boat in Lagoon/Molt drives of eiders           |
| Steller's Eider health monitoring        | Aug 25-Sept 25   | 100 birds captured                               | Boat in Lagoon/Molt drives of eiders           |
| Hunter Harvest AI sampling               | Sept & Oct       | 400+ samples from 4 species                      | Contact hunters using Izembek SGR              |
| Bird Strike Monitoring at NDB Tower      | year round       | 6 cameras                                        | None                                           |
| Monitoring Hovercraft Impacts            | year round       | 1/week                                           | None                                           |
| <u>Proposed Studies/Surveys</u>          |                  |                                                  |                                                |
| Sea Otter Surveys                        | year round       | quarterly                                        | Survey over Izembek Lagoon                     |
| <b>Alaska Fish and Game Surveys</b>      |                  |                                                  |                                                |
| <u>Commercial Fisheries</u>              |                  |                                                  |                                                |
| Southern Alaska Peninsula aerial surveys | June – September | 30-50 flights per season<br>150-200 flight hours | Includes rivers that drain into Izembek Lagoon |
| <u>Area Wildlife Biologist</u>           |                  |                                                  |                                                |
| Caribou Collaring – Spring               | early April      | capture x animals                                | Possible helicopter transit over lagoon        |
| Caribou Parturition Survey               | early June       | 1                                                | Possible helicopter transit over lagoon        |
| Post Caribou Calving Count               | June             | 1                                                | Possible helicopter transit over lagoon        |
| Caribou Calf Mortality Study             | early June       | capture x animals                                | Possible helicopter transit over lagoon        |
| Caribou Calf Telemetry                   | June-Sept        | 1/month                                          |                                                |
| Caribou Composition                      | October          | 1                                                | Possible helicopter transit over lagoon        |
| Caribou Collaring - Fall                 | October          | capture x animals                                | Possible helicopter transit over lagoon        |

-continued-

Table E1.–Page 3 of 3.

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**Other Surveys**

USGS – Biological Resource Division

|                        |         |                        |                                     |
|------------------------|---------|------------------------|-------------------------------------|
| Winter Brant Movements | Dec-Jan | 100-300 birds captured | Possible captures in Izembek Lagoon |
|------------------------|---------|------------------------|-------------------------------------|

University of Alaska-Fairbanks

|                                 |      |           |                            |
|---------------------------------|------|-----------|----------------------------|
| Invertebrates in Izembek Lagoon | July | ? Samples | Sampling in Izembek Lagoon |
|---------------------------------|------|-----------|----------------------------|

Minerals Management Service

|                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential for research on tides, oil spill modeling, benthic communities, fisheries, wildlife species (birds and marine mammals), and habitats to prepare for the 2012 off-shore lease sale in the Sale 92 area west of Nelson Lagoon. |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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*Source:* US Fish and Wildlife Refuge Izembek NWR, 2008.

Table E2. Biological Surveys/Projects by USFWS at Izembek NWR for 2008 Field Season

| Month     | Ground Survey/Inventory               | # Surveys/Samples | # People | Physical Requirements   |
|-----------|---------------------------------------|-------------------|----------|-------------------------|
| April     | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| May       | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| May       | Shorebird Point Counts                | 50-75 points      | 2        | Hiking                  |
| June      | Landbird Point Counts                 | 50-75 points      | 2        | Hiking                  |
| June      | Breeding Bird Survey                  | 1                 | 2        | Driving                 |
| June      | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| July      | Invertebrates in Izembek Lagoon       | 2 weeks           | 2+       | Boating/Eelgrass Wading |
| July      | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| July      | Waterfowl Brood Surveys               | 4                 | 2        | Hiking/Kayaking         |
| August    | Eelgrass biomass sampling             | multiple          | 4-5      | Boating/Eelgrass Wading |
| August    | Eelgrass productivity sampling        | 3 weeks           | 2        | Eelgrass Wading         |
| August    | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| August    | Berry Production Monitoring           | 20 transects      | 2        | Hiking                  |
| August    | Steller's Eider banding & AI Sampling | 200+ Samples      | 7-12     | Boating/Eelgrass Wading |
| September | Steller's Eider banding & AI Sampling | 200+ Samples      | 7-12     | Boating/Eelgrass Wading |
| September | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| September | Black Brant Production                | multiple          | 3-6      | Boating/Hiking          |
| September | Emperor Goose Production              | multiple          | 3-6      | Boating/Hiking          |
| September | Hunter Harvest AI sampling            | 400+ Samples      | 1-4      | None                    |
| October   | COASST Beached Bird Surveys           | 2                 | 2-4      | Boating/Hiking          |
| October   | Black Brant Production                | multiple          | 3-6      | Boating/Hiking          |
| October   | Emperor Goose Production              | multiple          | 3-6      | Boating/Hiking          |
| October   | Hunter Harvest AI sampling            | 400+ Samples      | 1-4      | None                    |

Source: US Fish and Wildlife Refuge Izembek NWR, 2008.



## **APPENDIX F: MAPS**





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# **Izembek State Game Refuge Management Plan**

## **Appendix F Maps**

by

**Francis Inoue and Jason Graham, Division of Sport Fish, Region V**

April, 2010

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Alaska Department of Fish and Game

Divisions of Habitat and Wildlife Conservation





## Izembek State Game Refuge Maps

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# **SOURCES FOR MAPS PROVIDED WITH IZEMBEK STATE GAME REFUGE MANANAGEMENT PLAN, PUBLIC REVIEW DRAFT**

## **LAND STATUS**

Base land status for this project comes from the Alaska Department of Natural Resources: ([http://www.asgdc.state.ak.us/metadata/vector/landstat/statewide/akstat\\_c63.html](http://www.asgdc.state.ak.us/metadata/vector/landstat/statewide/akstat_c63.html)). This coverage has been edited to reflect the land status information on DNR's status plats, BLM's MTP (<http://www.dnr.state.ak.us/cgi-bin/lris/landrecords>), the State of Alaska recorders' office (<http://www.dnr.state.ak.us/ssd/recoff/search.cfm>), and documented case reports (<http://www.dnr.state.ak.us/las/lasmenu.cfm>). Because Alaska is a non-recording state, there is no guarantee that additional undocumented land transfers have occurred that could potentially alter the data we have compiled. Land ownership is not static; consequently, even in the time it took to compile this information, some parcels may have changed ownership.

Alaska Heritage Resources Survey. 2005. Alaska Office of History and Archeology. (Archeological sites and shipwrecks).

Steller's Eider Federally Designated Critical Habitat: Federal Register, Vol. 66, No. 23 pages 8849-8884, 2/2/2001. (Map of CHA on page 8884).

NavStreets: Navteq 2004. For inter-agency use only. USFWS, Jerry Minick, GIS Analyst.

Sowl K. 2005. Personal communication and hardcopy map. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

Simpson, E., 2006. Personal communication. Habitat Biologist, Division of Sport Fish, Alaska Department of Fish and Game, Anchorage.

Geifer, J. 2006. Personal communication. Habitat Biologist, Division of Sport Fish, Alaska Department of Fish and Game, Anchorage.

Carter, M. 2006. Personal communication. Habitat Biologist, Division of Sport Fish, Alaska Department of Fish and Game, Anchorage.

## **BASE FEATURES**

### **Hydrography**

National Hydrography Dataset, U.S. Geological Survey, 2008.

### **Hillshade Features**

TOPO!, National Geographic Society, 2006.

## **BIOLOGICAL SPECIES**

### **Anadromous Fishes**

Atlas to the Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes: Southwest Region. Geographic Information Systems Data 2008. Division of Sport Fish, Alaska Department of Fish and Game, Anchorage.

### **Bald Eagles**

Sowl K. 2005. Personal communication and Datafile. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

## **Bear**

Alaska Habitat Management Guide 1986. Southwest Region: Reference maps. Volume I: Distribution of Mammals. Habitat Division, Alaska Department of Fish and Game, Juneau.

Most Environmentally Sensitive Areas Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Land Protection Plan for Izembek National Wildlife Refuge Complex 1998. U. S. Fish and Wildlife Service, Department of Interior, Anchorage. (Bear denning areas).

Dau, C. 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage.

Sowl K. 2005. Personal communication. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

## **Blue Mussel**

Research Planning Institute, Inc. May 2002. ESI Atlas. Aleutian Islands, Alaska. Geographical Information Systems Data. Prepared for the National Oceanic and Atmospheric Administration, Hazardous Materials Response and Assessment Division, Seattle, Washington.

McRoy, P. 2005. Personal communication. University of Fairbanks.

Spalenger, A. 2005. Personal communication. Cold Bay

## **Caribou**

Alaska Habitat Management Guide 1986. Southwest Region: Reference maps. Volume I: Distribution of Mammals. Habitat Division, Alaska Department of Fish and Game, Juneau.

McDonald, M. 2003. Personal communication. Wildlife Biologist, Division of Wildlife Conservation, Alaska Department of Fish and Game, Anchorage.

Taylor, E. and Sowl, K. 2008. Wildlife Biologists, U.S. Fish and Wildlife Service, Cold Bay. Geographic Information Systems Data for Map A-7 Caribou Relative Abundance from Izembek National Wildlife Refuge Final Report for the 2004 Biological Program Review, June 2008.

Fink, M. et al. 2003. Correspondence between ADF&G and ADNR Habitat Division.

Sowl K. 2009. Personal communication and scanned maps. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

Dale, B. 2009. Personal communication. Wildlife Biologist, Division of Wildlife Conservation, Alaska Department of Fish and Game, Anchorage.

## **Eelgrass**

Ward, David. USGS, from Distribution and Stability of Eelgrass Beds at Izembek Lagoon, Alaska (David J. Ward, Carl J. Markon, David C. Douglas) 1997; Alaska Biological Science Center, USGS Biological Resources Division, Anchorage, Ak.; USGS/EROS Alaska field Office, HUGHES STX Corp. Anchorage, Ak.; Data were received as geographical Information Systems shapefile.

**Essential Fish Habitat** (Red King Crab, Eulachon, Walleye, Yellowfin sole, Sculpin, Green Turbot, Pacific Cod, Alaska Plaice):

Essential Fish Habitat in fishery management plans, National Oceanic and Atmospheric Administration, Habitat Conservation Division. Geographical Information Systems Data downloaded from site <http://www.fakr.noaa.gov/efh/download/efhshp.htm> 12/15/05. (As noted on map)

Olson, J. 2005. Personal communication. Biologist, National Marine Fisheries Service, Anchorage.

## **Harbor Seal**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Research Planning Institute, Inc. May 2002. ESI Atlas. Aleutian Islands, Alaska. Geographical Information Systems Data. Prepared for the National Oceanic and Atmospheric Administration, Hazardous Materials Response and Assessment Division, Seattle, Washington.

Withrow, D. 2005. Personal communication. Biologist, National Marine Mammal Laboratory, NOAA, Seattle, Washington.

Hiruki-Raring, L. 2005. Personal communication and Geographical Information Systems Data. (Harbor Seal point data). GIS Analyst, National Marine Mammal Laboratory, NOAA, Seattle, Washington.

Dau, C. 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage.

## **Herring**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

### **Rare Bird (Kittletz's Murrelet)**

Michaelson J. 2005. Personal communication, Literature Reference and Geographical Information Systems Data. Data Manager, Alaska Natural Heritage Program, Anchorage.

Lenz, J. 2005. Personal communication and literature reference. Information Manager, Alaska Natural Heritage Program, Anchorage.

## **Rare Plants**

Alaska Natural Heritage Program; database for rare plants endemic to Alaska or have low global (G1-G3) and / or state (S1-S3) ranks. Geographical Information systems data and pers. comm. from Julie Michaelson.

## **Razor Clam**

Research Planning Institute, Inc. May 2002. ESI Atlas. Aleutian Islands, Alaska. Geographical Information Systems Data. Prepared for the National Oceanic and Atmospheric Administration, Hazardous Materials Response and Assessment Division, Seattle, Washington.

Dau, C. 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage.

Sowl K. 2005. Personal communication. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

## **Seabird**

U.S. Fish Wildlife Service 2004. Beringian Seabird Colony Catalog Computer Archives. U.S. Fish and Wildlife Service, Anchorage.

Sowl K. 2005. Personal communication. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

## **Sea Lion**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Research Planning Institute, Inc. May 2002. ESI Atlas. Aleutian Islands, Alaska. Geographical Information Systems Data. Prepared for the National Oceanic and Atmospheric Administration, Hazardous Materials Response and Assessment Division, Seattle, Washington.

Rehberg, M. 2005. Personal communication and coordinate data. Wildlife Biologist, Division of Wildlife Conservation, Alaska Department of Fish and Game, Anchorage.

Lowell, F. 2005. Personal communication and site data. National Oceanic and Atmospheric Administration.

Pitcher, K. 2005. Personal communication and coordinate data. Wildlife Biologist, Division of Wildlife Conservation, Alaska Department of Fish and Game, Anchorage. (Removal of Sea Lion rookery polygon north of Amak Island and east of Sea Lion Rocks).

### **Sea Otter**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Doroff, A. 2005. Personal communication and hardcopy maps. Wildlife Biologist, U.S. Fish and Wildlife Service, Anchorage.

Sowl K. 2005. Personal communication and hardcopy maps. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

### **Shorebirds**

T. Lee Tibbitts, 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage.

Dau, C. 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage.

Tibbitts, Gill, Dau, November 1996. Abundance and Distribution of Shorebirds Using Intertidal Habitats of Izembek National Wildlife Refuge, Alaska. Alaska Science Center, Biological Resources Division, U. S. Geological Survey, Anchorage.

### **Waterfowl**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Alaska Habitat Management Guide 1986. Southwest Region: Reference maps. Volume 2: Distribution of Birds. Habitat Division, Alaska Department of Fish and Game, Juneau

Dau, C. 2005. Personal communication and hardcopy map. Wildlife Biologist, Migratory Birds, U.S. Fish and Wildlife Service, Anchorage. (Including Steller Eider)

Sowl K. 2005. Personal communication. Wildlife Biologist, U.S. Fish and Wildlife Service, Cold Bay.

### **Walrus**

Most Environmentally Sensitive Area Atlas 2000. Habitat and Restoration Division, Alaska Department of Fish and Game, Anchorage.

Alaska Habitat Management Guide 1986. Southwest Region: Reference maps. Volume 1: Distribution of Mammals. Habitat Division, Alaska Department of Fish and Game, Juneau

Miller, J. 2005. Personal communication. Wildlife Biologist, U.S. Fish and Wildlife Service, Anchorage.

### **Subsistence**

Alaska Habitat Management Guide 1985. Southwest Region: Reference maps. Volume 4: Human Use of Fish and Wildlife. Habitat Division, Alaska Department of Fish and Game, Juneau

## **COMMUNITY OF ORIGIN**

### **Cold Bay**

John Wright, field research, 1982 and 1983. See Division of Subsistence, ADF&G. 1984. Bristol Bay Region Subsistence Profile for description of methodology and further information. Data were collected through interviews with two local experts. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.



Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

### **False Pass**

John Wright, field research, 1982 and 1983. See Division of Subsistence, ADF&G. 1984. Bristol Bay Region Subsistence Profile for description of methodology and further information. Data were collected from four local experts. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.

### **Sand Point**

Data were collected by David Andersen, Michael Coffing, and Amy Paige (Division of Subsistence, Alaska Department of Fish and Game) in January and February, 1993 during interviews with ten Sand Point residents. All respondents were lifelong residents of the Sand Point area and ranged in age from 40 to 70. They mapped the areas they have used for subsistence activities during their lifetimes while living in Sand Point. See Division of Subsistence Technical Paper No. 226, "Noncommercial Harvests and Uses of Wild Resources in Sand Point, Alaska, 1992" (Fall et al. 1993), for more information.

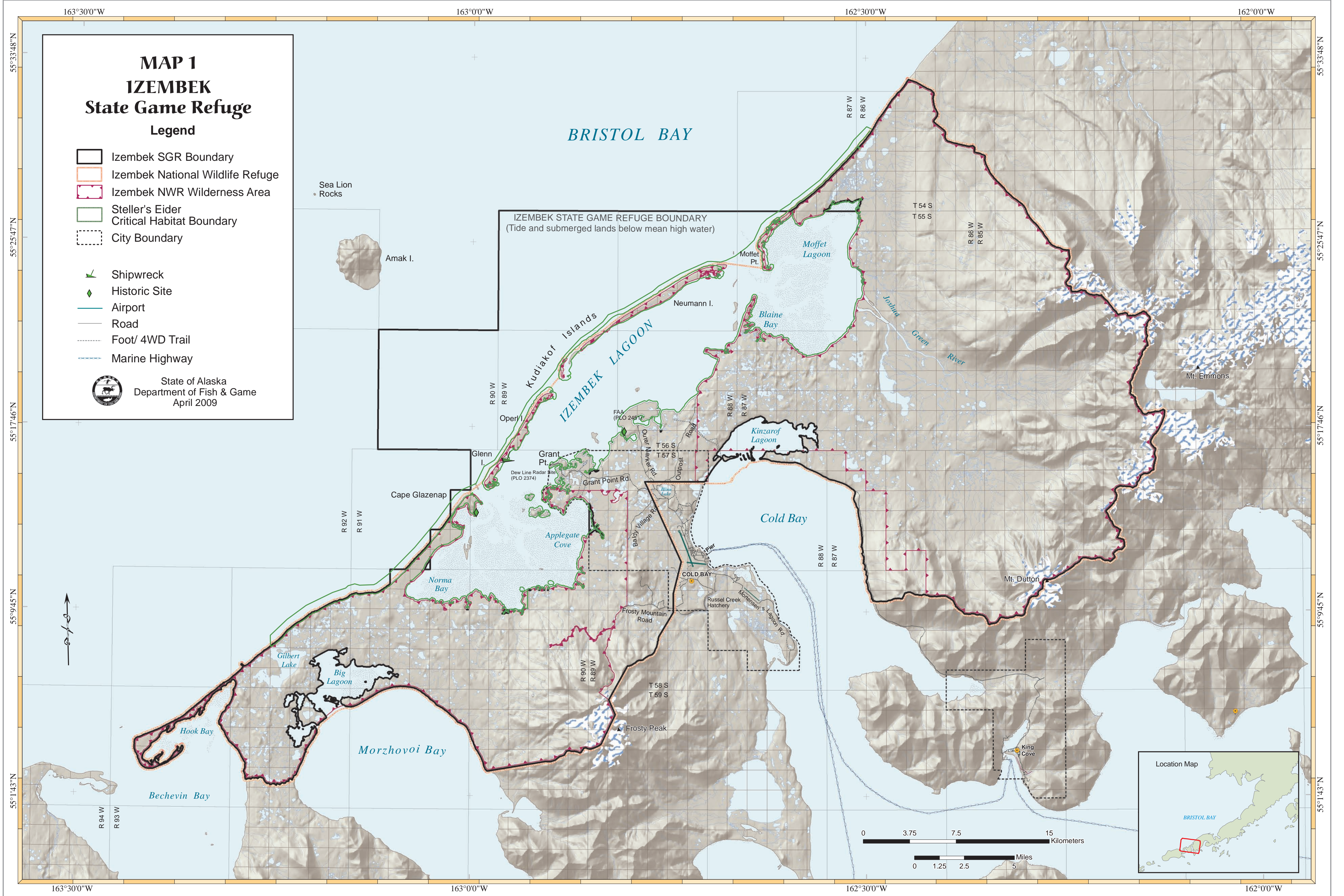
Because not all residents of the community were interviewed and because subsistence use areas change through time this map may be only a partial depiction of areas important to Sand Point. Consult with the community for more definitive information.

### **King Cove/Belkovsky**

John Wright, field research, 1982 and 1983. See Division of Subsistence, ADF&G. 1984. Bristol Bay Region Subsistence Profile for description of methodology and further information. Data were collected from two local experts. Data represent contemporary resource use areas, defined as areas used over the 1963 to 1983 time period.

Data depicted on this map are based on research conducted in 1982 and 1983. Other areas may also be used for resource harvesting. Consult with local communities for definitive information.






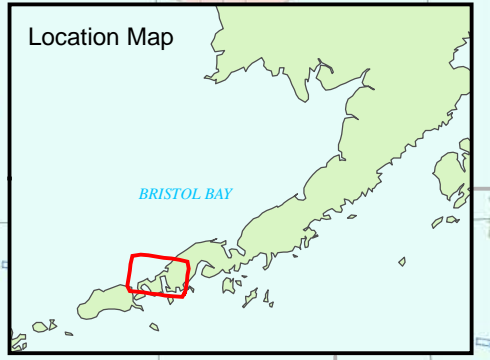
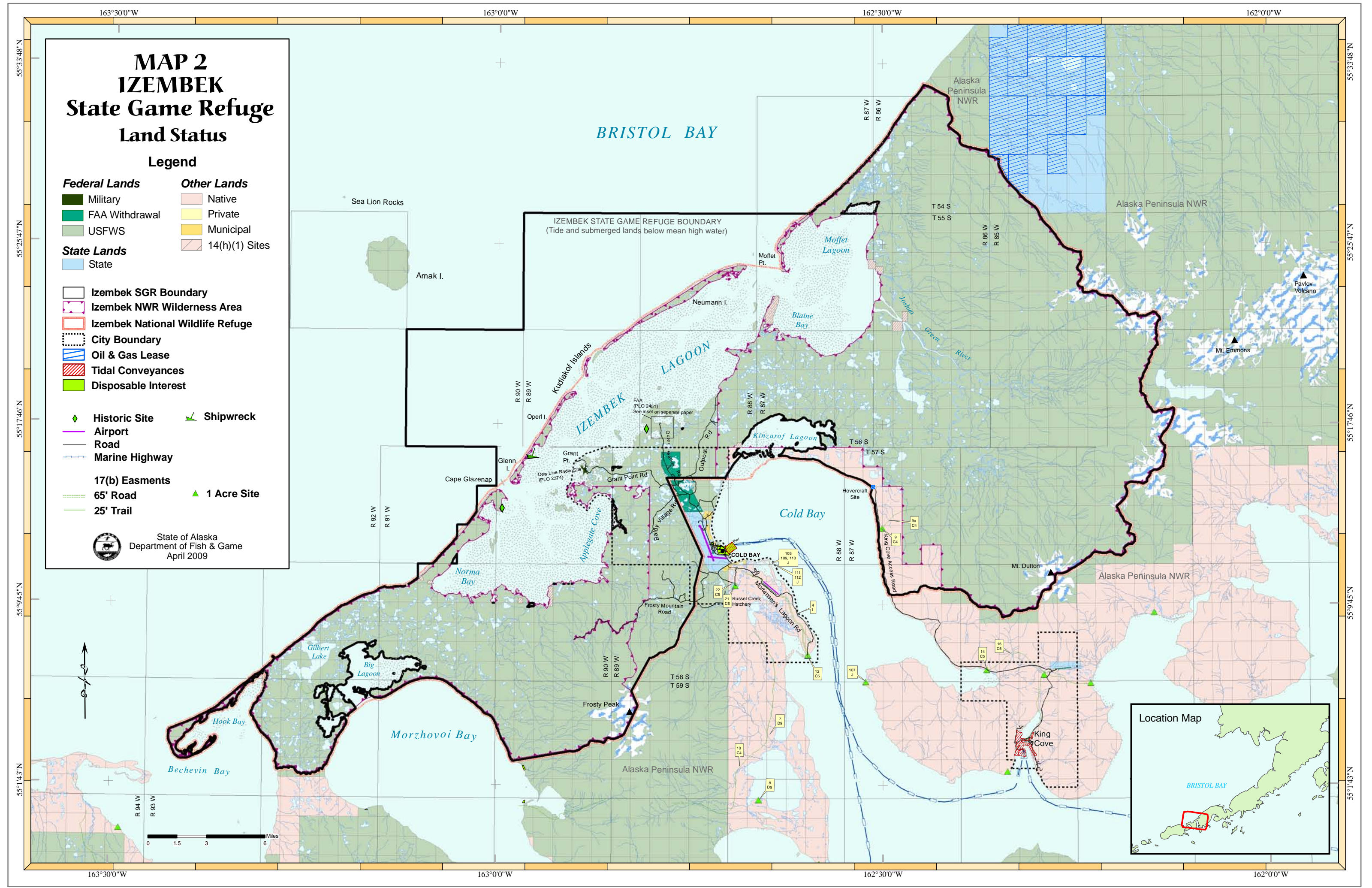


# MAP 2 IZEMBEK State Game Refuge Land Status

## Legend

- Federal Lands**
  - Military
  - FAA Withdrawal
  - USFWS
- Other Lands**
  - Native
  - Private
  - Municipal
  - 14(h)(1) Sites
- State Lands**
  - State
- Izembek SGR Boundary
  - Izembek NWR Wilderness Area
  - Izembek National Wildlife Refuge
  - City Boundary
  - Oil & Gas Lease
  - Tidal Conveyances
  - Disposable Interest
- Historic Site
  - Airport
  - Road
  - Marine Highway
- 17(b) Easements**
  - 65' Road
  - 25' Trail
- Shipwreck
  - 1 Acre Site
- 

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# MAP 3

## Existing Locations of PLO 2451 and 44-LD-513 Based on Legal Descriptions

### Land Status Federal Lands

USFWS

### Legend

- PLO 2451 legal description
- Right Of Way 44-LD-513 legal description
- PLO 2451 As shown on BLM Master Title Plat
- Proposed relocation of PLO 2451



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Izembek Lagoon

R 89 W

R 88 W

30

29

See Inset

31

32

Outer Marker Rd

T 56 S

T 57 S

### Location Map

BRISTOL BAY

Izembek Lagoon

Cold Bay

0 0.5 Miles

### Inset: Location of existing FAA Structures

Existing Equipment Building

The existing locations PLO 2451 and 44-LD-513 (ROW) are shown in purple, these are based on the legal description. The legal descriptions for these two features do not encompass all existing FAA structures, as confirmed by the on-the-ground GPS readings.

The legal description for PLO 2451 places it entirely within Izembek Lagoon. The legal description for 44-LD-513 does not properly connect it to PLO 2451, nor does it describe the existing road.

Existing tower and guy lines

Existing gravel pad for installation of Volcom whip antenna.

Existing tower and guy lines

Outer Marker Road



# MAP 4

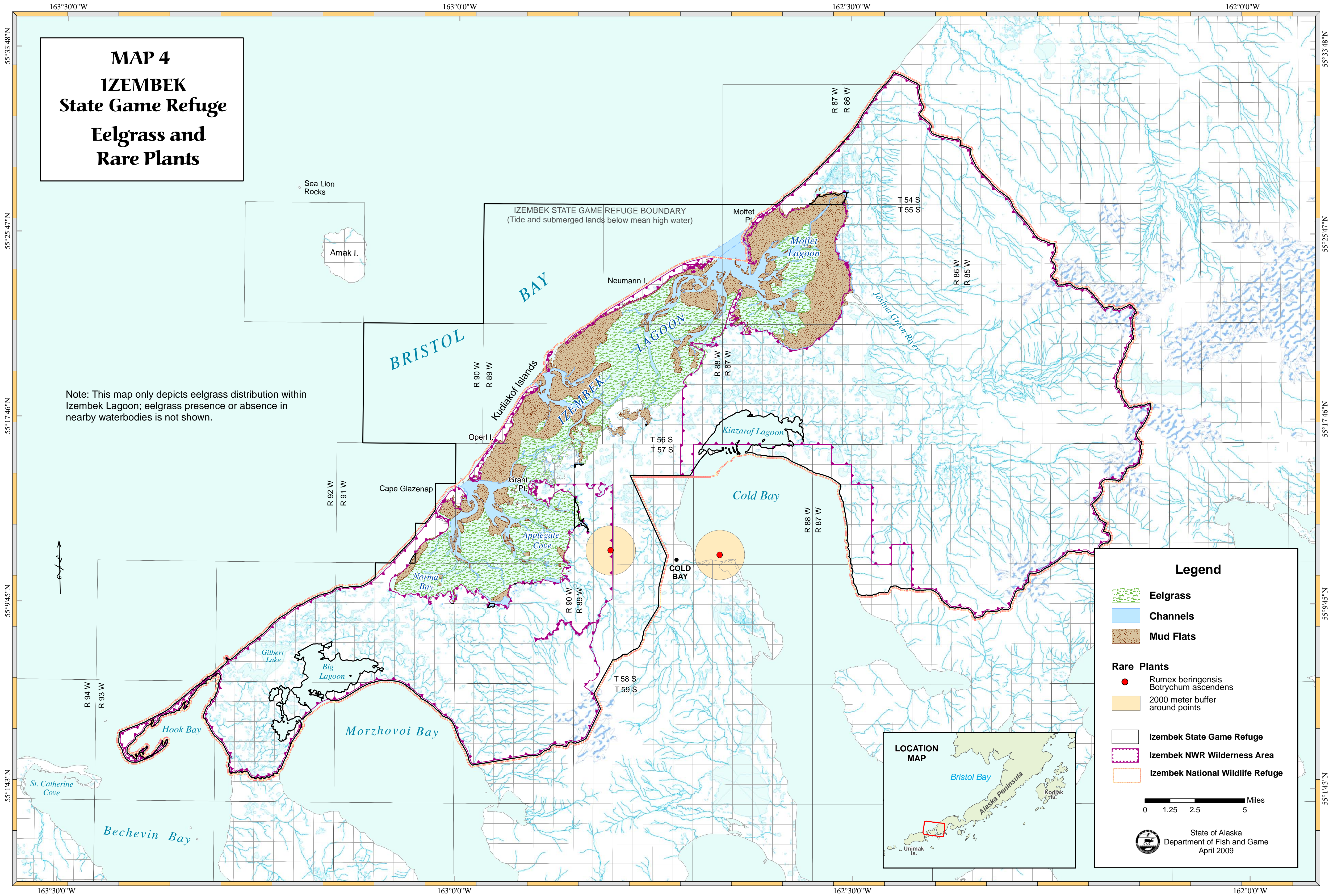
## IZEMBEK

### State Game Refuge

### Eelgrass and

### Rare Plants

Note: This map only depicts eelgrass distribution within Izembek Lagoon; eelgrass presence or absence in nearby waterbodies is not shown.



#### Legend

- Eelgrass
- Channels
- Mud Flats

#### Rare Plants

- Rumex beringensis*
- Botrychum ascendens*
- 2000 meter buffer around points

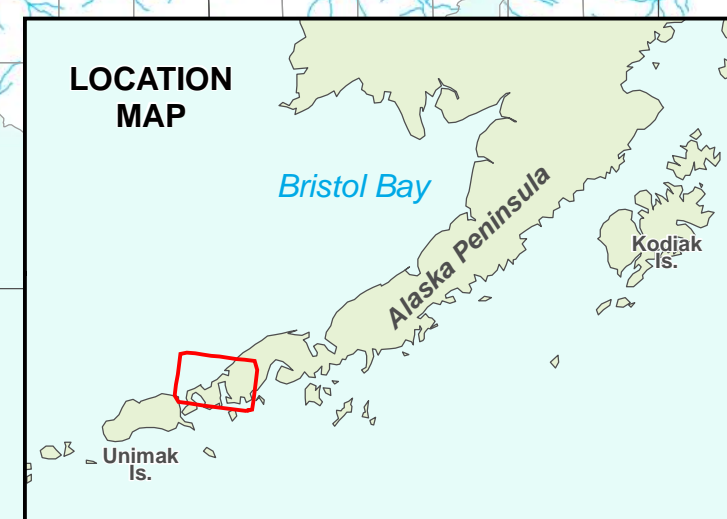
- Izembek State Game Refuge
- Izembek NWR Wilderness Area
- Izembek National Wildlife Refuge

0 1.25 2.5 5 Miles



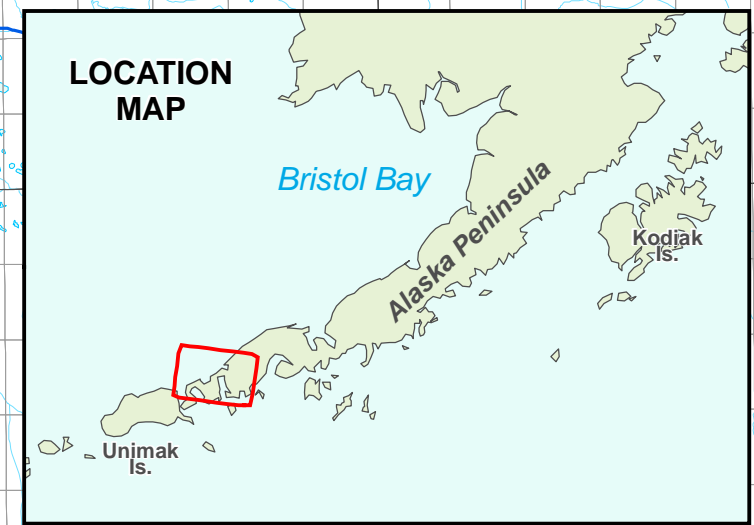
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#### LOCATION MAP





# MAP 5 IZEMBEK State Game Refuge Birds and Fish



## Waterfowl

### Spring Staging Within Izembek Lagoon:

Black Brant  
Emperor  
Steller's Eider

### Fall Staging Within Izembek Lagoon:

Black Brant  
Canada Goose  
Emperor  
Steller's Eider

(Note: Wintering waterfowl also occur in Bering Sea when ice free)

IZEMBEK STATE GAME REFUGE BOUNDARY  
(Tide and submerged lands below mean high water)

## Legend

- Anadromous Waters
- Known Seabird Colonies
- Known Eagle Nests
- Tundra Swan Spring/ Fall Use Area
- Waterfowl  
Moderate Winter Concentrations  
High Winter Concentrations  
Spring and Fall Staging Concentrations
- Izembek State Game Refuge  
Izembek NWR Wilderness Area  
Izembek National Wildlife Refuge

0 1.5 3 6 Miles



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# MAP 6 IZEMBEK State Game Refuge Steller's Eider and Shorebirds

Sea Lion  
Rocks

Amak I.

IZEMBEK STATE GAME REFUGE BOUNDARY  
(Tide and submerged lands below mean high water)

Moffet  
Pt.

Neumann I.

Kudlakof Islands

Opert I.  
Grant  
Pt.

Cape Glazenap

Applegate  
Cove

Norma  
Bay

Gilbert  
Lake

Big  
Lagoon

Hook  
Bay

Bechevin Bay

Morzhovoi Bay

Cold Bay

COLD BAY

T 58 S  
T 59 S

North Creek

Joshua Green River

Kinzarof Lagoon

Moffet Lagoon

LOCATION  
MAP

Bristol Bay

Alaska Peninsula

Kodiak  
Is.

Unimak  
Is.



## Shorebirds:

Some species that do not flock (e.g., Pectoral sandpipers, sharp-tailed sandpipers) are missed by just looking for areas of high concentrations. Local breeders likely depend on food obtained in the lagoon to sustain them during egg-laying and chick rearing. Wintering shorebirds likely move around to take advantage of many ice-free areas. Spring use has fewer birds and is of shorter duration. Areas shown are peak use sites. Other areas are used also.

## Legend

### Steller's Eider

- Dispersed Molting Concentration
- High Molting Concentration
- Winter Concentration

### Shorebird

- Fall Migration
- Winter Concentration

### Steller's Eider Critical Habitat Boundary

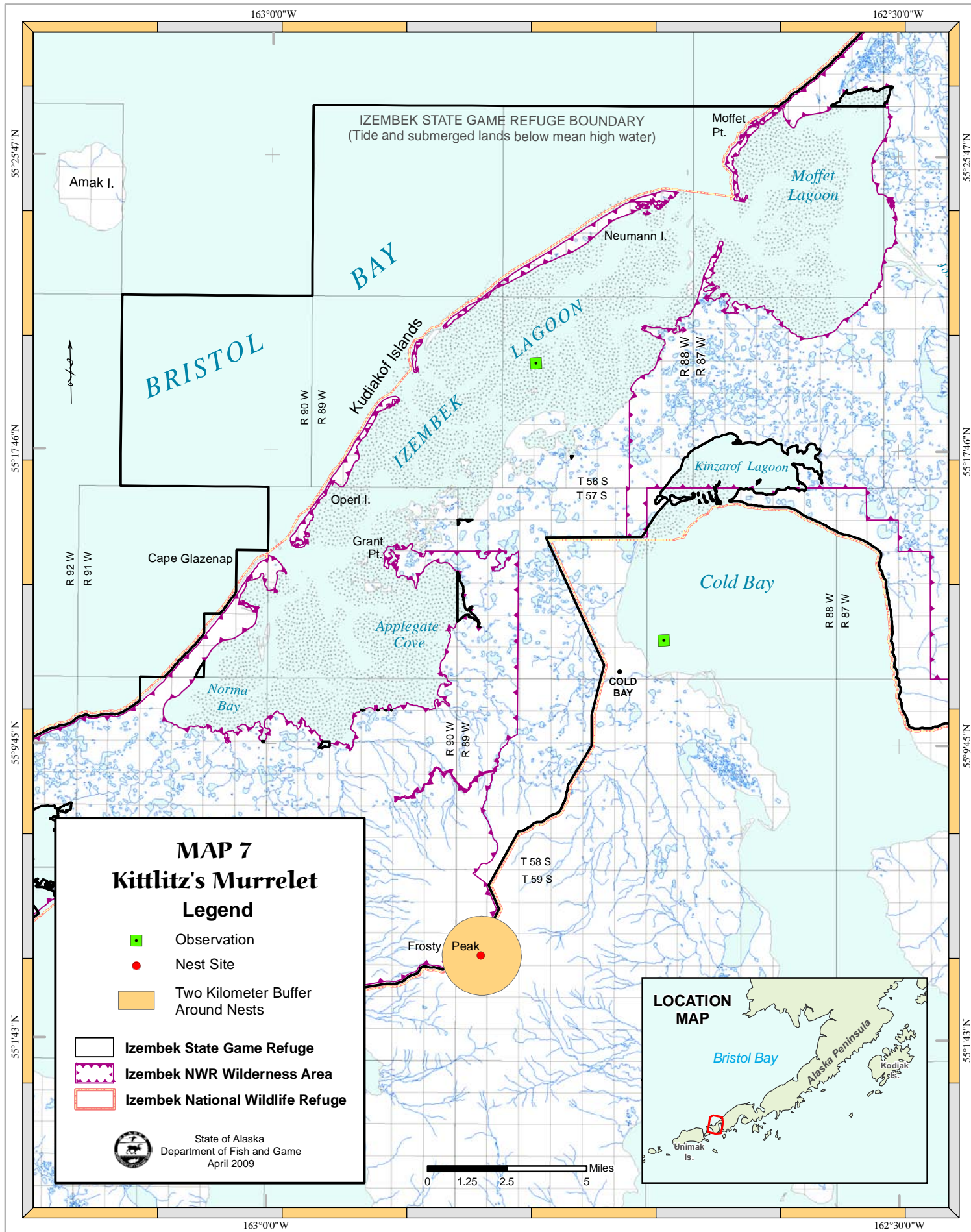
- Izembek State Game Refuge
- Izembek NWR Wilderness Area
- Izembek National Wildlife Refuge

0 1.25 2.5 5 Miles



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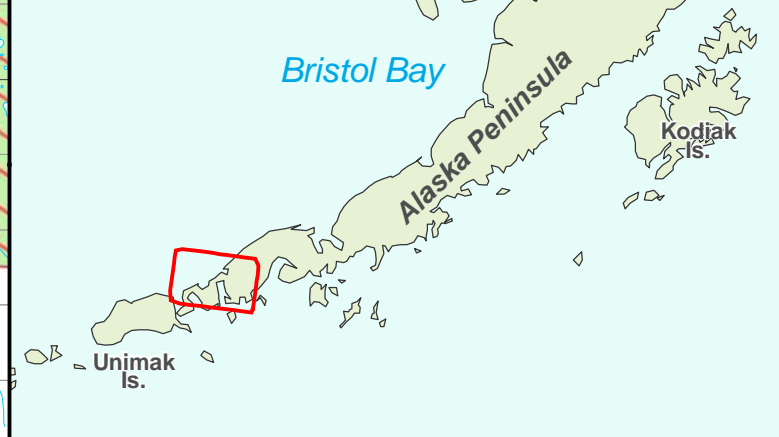


# MAP 8 IZEMBEK State Game Refuge Marine Mammal, Caribou and Herring

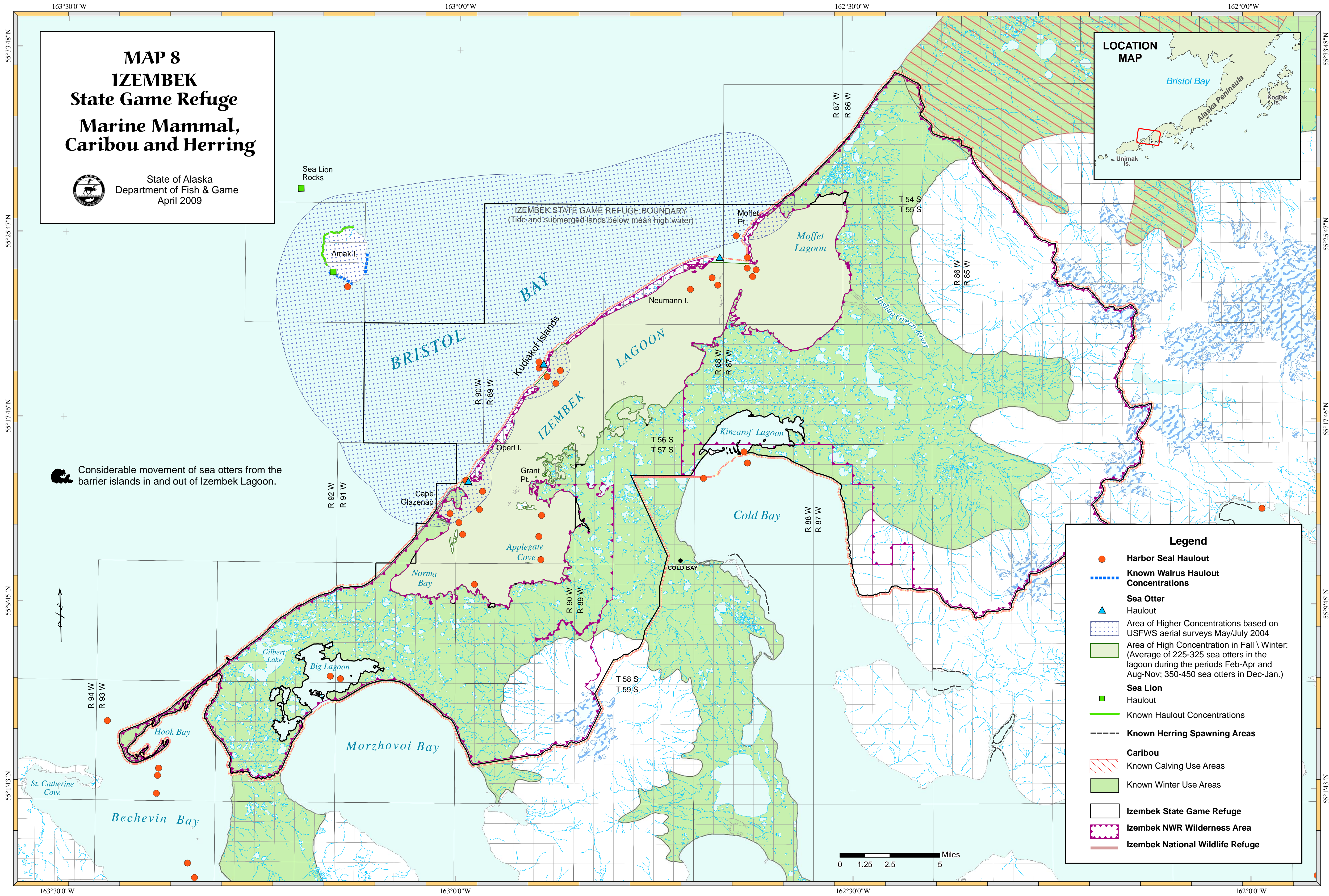


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## LOCATION MAP



Considerable movement of sea otters from the barrier islands in and out of Izembek Lagoon.







## Legend

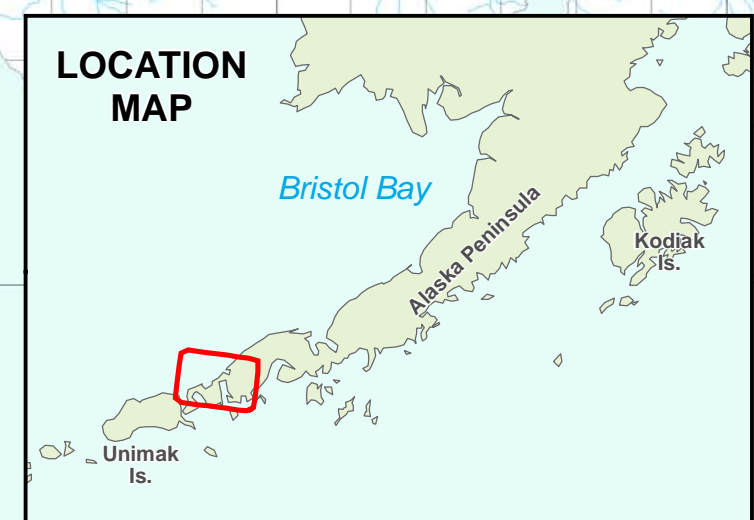
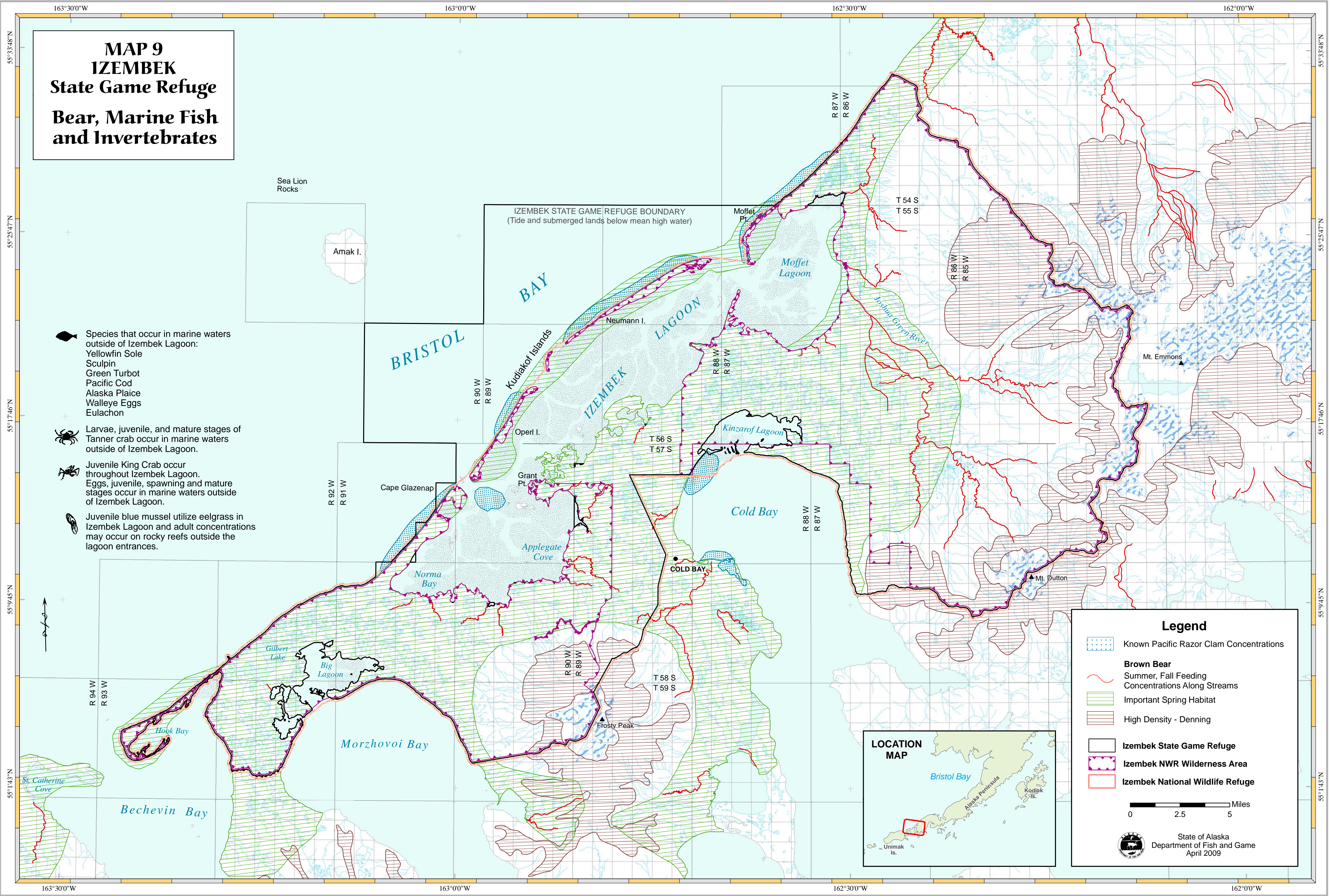
- Harbor Seal Haulout
- Known Walrus Haulout Concentrations
- Sea Otter Haulout
- Area of Higher Concentrations based on USFWS aerial surveys May/July 2004
- Area of High Concentration in Fall \ Winter: (Average of 225-325 sea otters in the lagoon during the periods Feb-Apr and Aug-Nov; 350-450 sea otters in Dec-Jan.)
- Sea Lion Haulout
- Known Haulout Concentrations
- Known Herring Spawning Areas
- Caribou Known Calving Use Areas
- Known Winter Use Areas
- Izembek State Game Refuge
- Izembek NWR Wilderness Area
- Izembek National Wildlife Refuge

0 1.25 2.5 5 Miles

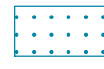



# MAP 9 IZEMBEK State Game Refuge Bear, Marine Fish and Invertebrates


-  Species that occur in marine waters outside of Izembek Lagoon:  
Yellowfin Sole  
Sculpin  
Green Turbot  
Pacific Cod  
Alaska Plaice  
Walleye Eggs  
Eulachon
-  Larvae, juvenile, and mature stages of Tanner crab occur in marine waters outside of Izembek Lagoon.
-  Juvenile King Crab occur throughout Izembek Lagoon. Eggs, juvenile, spawning and mature stages occur in marine waters outside of Izembek Lagoon.
-  Juvenile blue mussel utilize eelgrass in Izembek Lagoon and adult concentrations may occur on rocky reefs outside the lagoon entrances.




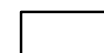
**Legend**


 Known Pacific Razor Clam Concentrations


 **Brown Bear**  
Summer, Fall Feeding Concentrations Along Streams

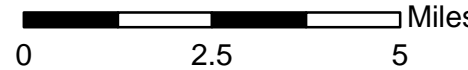
 Important Spring Habitat


 High Density - Denning

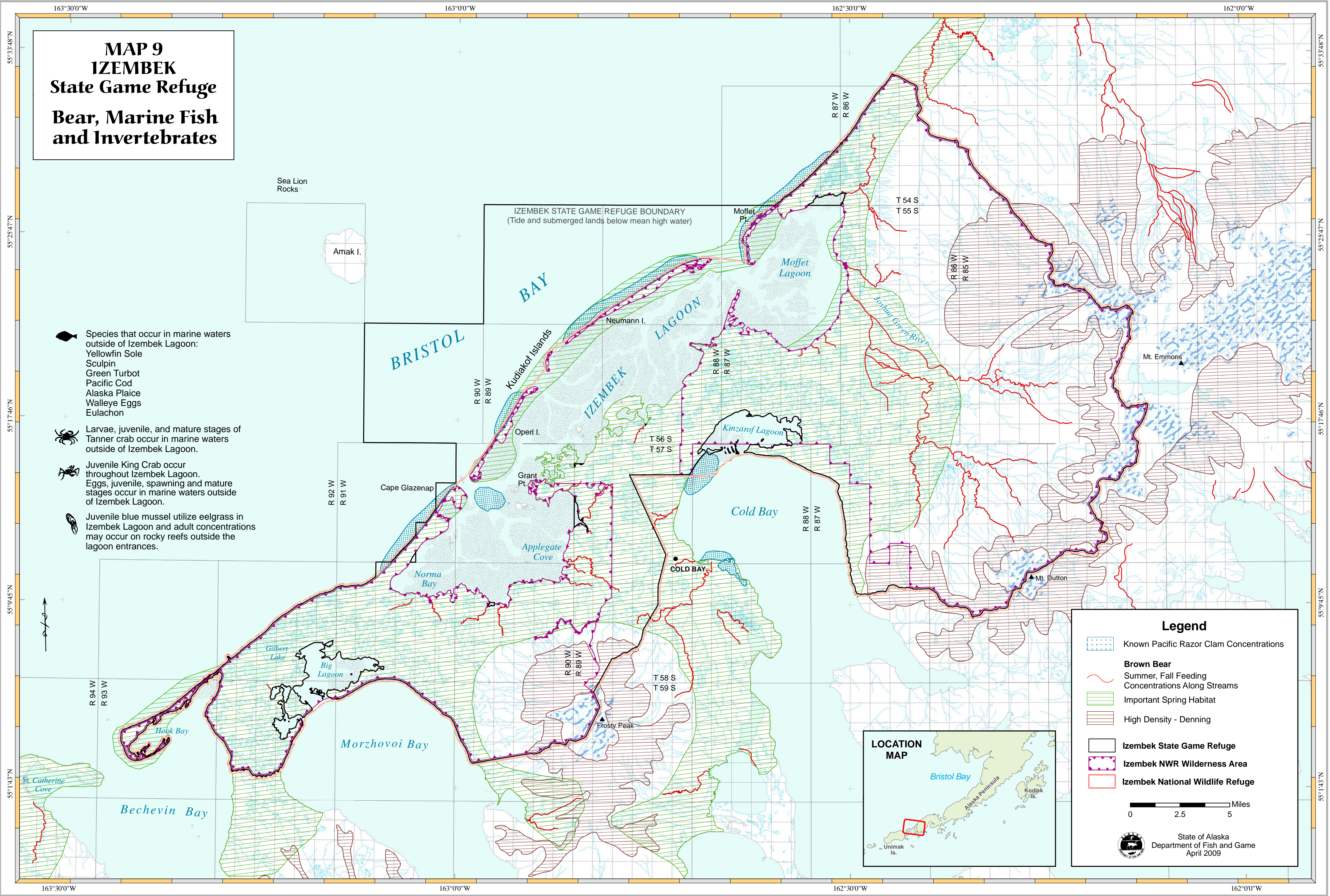
 Izembek State Game Refuge

 Izembek NWR Wilderness Area

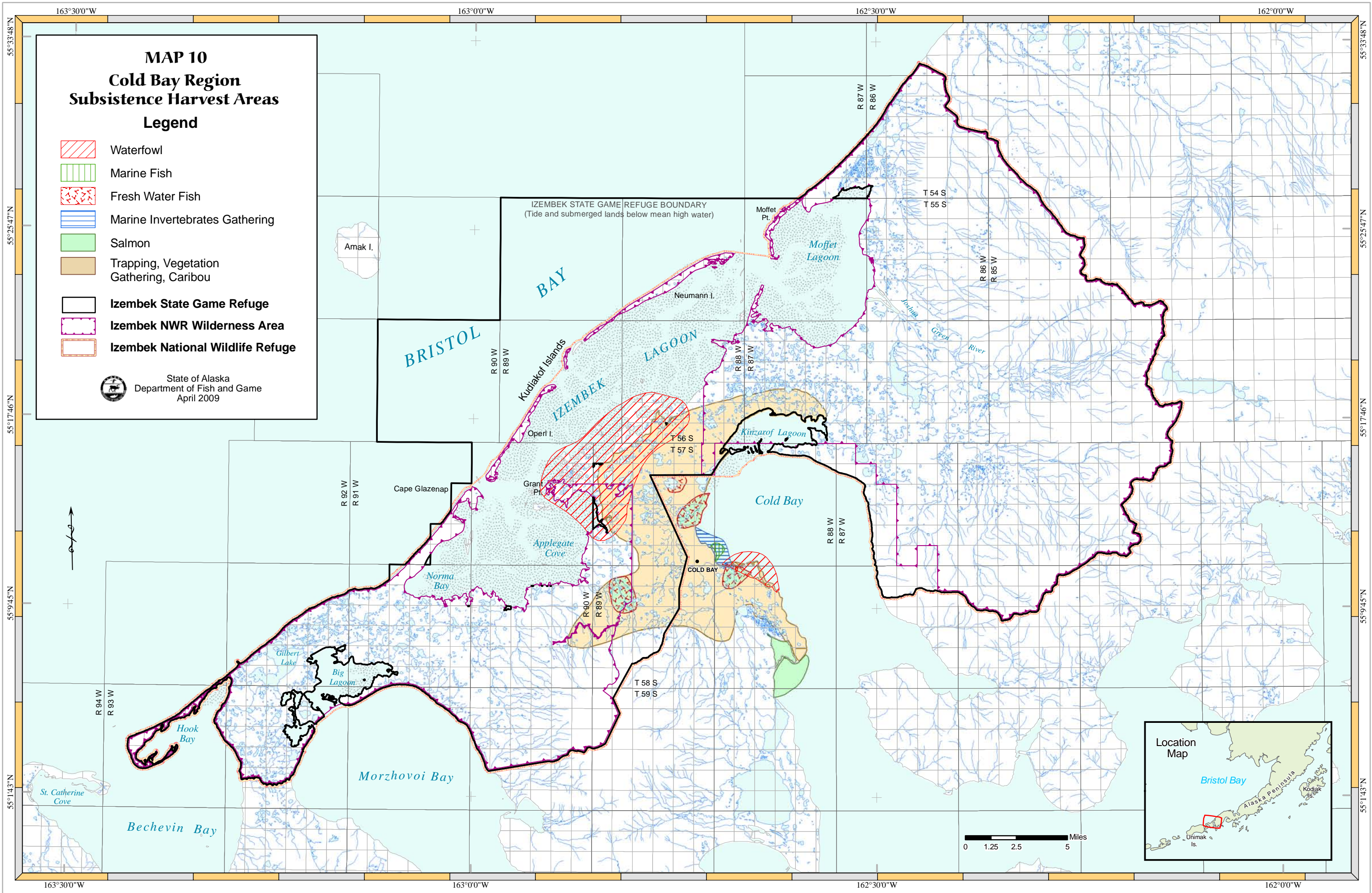
 Izembek National Wildlife Refuge

  
0 2.5 5 Miles

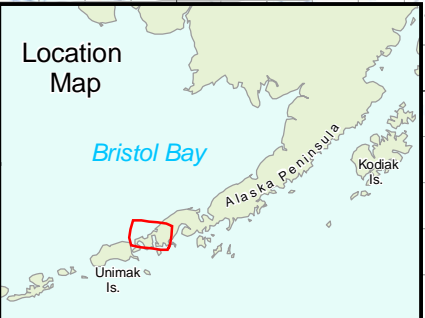
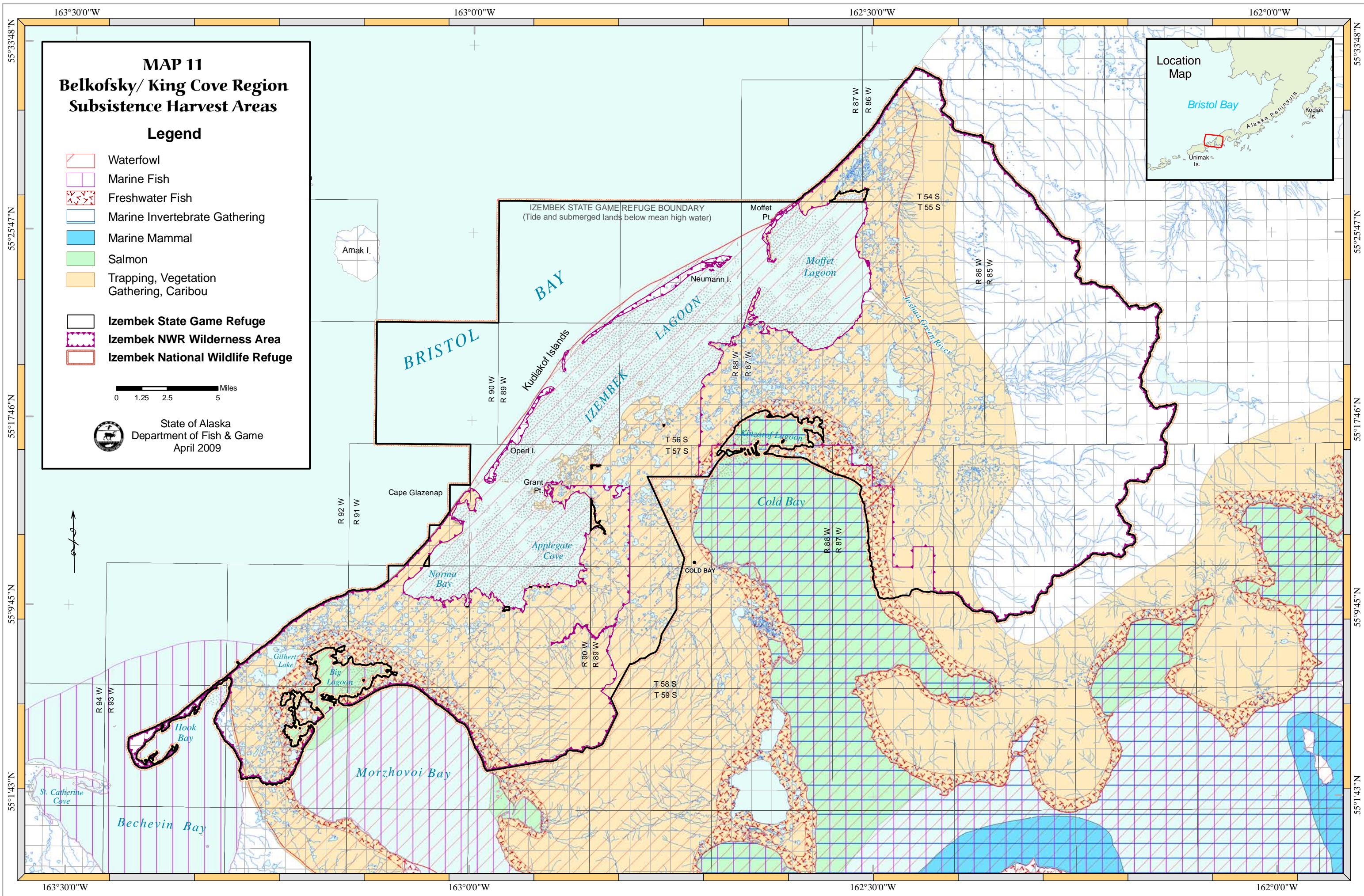
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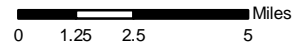


**MAP 11**

**Belkofsky/ King Cove Region  
Subsistence Harvest Areas**

**Legend**

- Waterfowl
- Marine Fish
- Freshwater Fish
- Marine Invertebrate Gathering
- Marine Mammal
- Salmon
- Trapping, Vegetation  
Gathering, Caribou
- Izembek State Game Refuge
- Izembek NWR Wilderness Area
- Izembek National Wildlife Refuge



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