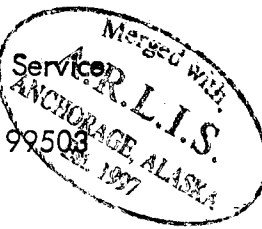


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POPULATION DYNAMICS OF MARINE BIRDS

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TABLE OF CONTENTS

	Page
<u>Abstract</u>	iv
Introduction	1
Current State of Knowledge	1
Study Area	2
Methods	3
Results and Discussion	3
Conclusions	4
Summary of 4th quarter operations	4
Tables	8
Maps	13

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LIST OF TABLES

Table		Page
1	Relative abundance of birds at sites where ecological investigations of seabird colonies are being conducted by OCSEAP and other programs.	8
2	Number of studies of dominant species of birds in coastal Alaska during summer by program and by region, 1975-76.	12

LIST OF MAPS

Map		Page
1	Location of sites for studies of birds in coastal habitats by OCSEAP and other programs, 1975-76.	13

Abstract: The characteristic dynamics of Alaskan marine bird populations are being described from studies conducted at 12 OCSEAP-funded and 6 nonOCSEAP-funded U. S. Fish and Wildlife Service field camps along the North Pacific coast and the southern Bering Sea coast of Alaska. Information on productivity, production, mortality, and chronology of events will be acquired for most of the more representative and abundant species of birds using these localities. The status of existing information is cursorily reviewed and the plans for the 4th quarter are given.

INTRODUCTION

The characteristic dynamics of Alaskan marine bird populations are largely undescribed. This research unit addresses the Alaskan Outer Continental Shelf Energy Assessment Program's (OCSEAP) Task A6 which seeks to remedy that informational deficiency. We will be appraising productivity, production, mortality, and chronology of events for several of the more representative and abundant species of birds over much of their range in Alaska.

Because some species of marine birds are known not to be capable of production until 3 or more years of age, meaningful information on survival and contribution to production of various year classes of some species may not be obtained until from 5 to 10 years after initiation of these studies. However, this long-term requirement does not preclude the collection and evaluation of shorter term information on gross dynamics of populations over larger geographical regions. The enigma surrounding the breeding sites of the marbled and Kittlitz's murrelets typifies some of the problems encountered in doing significant studies of the dynamics of even some of the more numerically important species of birds.

Resource managers require information on the population dynamics of most of the nearly hundred species of birds regularly or occasionally frequenting Alaskan coastal waters and lands subject to impacts from outer continental shelf (OCS) developments. Understanding the critical periods of the breeding cycle when birds, eggs, young, or all are most vulnerable to losses and determining what might be biologically tolerable losses (not necessarily equatable to socially acceptable losses) are important in determining the short-term and long-term consequences of the proposed actions and essential for mitigating losses through control measures.

CURRENT STATE OF KNOWLEDGE

Many of the ornithological studies summarized by Gabrielson and Lincoln (1959) provide information useful in characterizing population dynamics of some species at some specific localities in coastal Alaska. Dates of arrival, nesting, hatching, and fledging were often recorded, but departure dates tended to be missed. The numbers of eggs found in nests collected for museums were dutifully reported, but usually without indication as to whether the clutches were incomplete, complete, or well into incubation, or the number, size, and state of clutches not collected. Examples of natural mortality, unless bizarre or spectacularly large were seldom noted. Much of the early information did not express data in terms of means, ranges, variation or other statistics which permit predictions or allows meaningful comparisons.

Ashmole (1971) and Drury (1975), in review papers, discuss factors regulating population of marine birds; and Drury's treatment is particularly germane to the Alaskan OCS areas since he treated birds of Alaska and other northern latitudes. Bartonek et al. (1971) and Sowl and

Bartonek (1974) describe many man-caused influences that may be or will be limiting bird populations in coastal Alaska. Bailey and Davenport (1972) and Barry (1968), respectively, describe spectacularly large mortalities to common murres in Bristol Bay and king eiders in the Beaufort Sea.

Published information and unpublished information other than that resulting from OCSEAP studies covers either breeding chronology, productivity, natality, mortality, or all, for the following birds of coastal Alaska: double-crested and pelagic cormorants (Matthew Dick personal communications), cackling Canada geese (e.g., Olson 1950, Mickelson 1975), Aleutian Canada geese (G. Vernon Byrd personal communications), dusky Canada geese (Robert Bromley personal communications), black brant (e.g., Jones 1964, 1970; Hansen and Nelson 1957; Olson 1950, 1954), emperor geese (Headley 1967, Eisenhauer and Kirkpatrick 1975), spectacled eiders (Dau 1974, Mickelson 1975), common and king eiders (Schamel 1974), bald eagles (Hensel and Troyer 1964, Sprunt et al. 1973), Peale's peregrine falcons (White et al. 1971), black oystercatchers (Webster 1941), pectoral sandpipers (Pitelka 1959), dunlins (Holmes 1966, 1971), red phalaropes (Douglas Schamel personal communications), glaucous gulls (Swartz 1966, Schamel 1974), black-legged kittiwakes (Swartz 1966, David Snarski personal communications), common and thick-billed murres (Swartz 1966), black guillemots (Divoky et al. 1974), Kittlitz's murrelet (e.g., Bailey 1973), parakeet auklet (Sealy and Bedard 1974), and horned puffins (Swartz 1966, Sealy 1973a, 1973b). Published information on population dynamics for birds in coastal British Columbia with obvious relevance to southeastern Alaska includes that for the glaucous-winged gull (Vermeer 1963), pigeon guillemots (Thorenson and Booth 1958, Drent 1965), and marbled murrelets (Sealy 1974). Important data on the dynamics of bird population were collected at several sites where the entire avifauna was being studied, e.g., at Cape Thompson on the Chukchi Sea coast (Williamson, et al. 1966, Swartz 1966), Point McIntyre on the Beaufort Sea coast (Bergman 1974), the Clarence Rhode National Wildlife Refuge on the Yukon-Kuskokwim delta (Calvin J. Lensink personal communications), the coastal lowlands on the north side of the Seward Peninsula (Thayer 1951), and Ugaiushak Island south of the Alaska Peninsula (George J. Divoky personal communications).

Because little of the information was collected concurrently, generalizations about what might or might not be expected for a species over its range within Alaska should be done with extreme caution and points to the value of the OCSEAP effort being widely spread over many species range and of sufficient duration to measure annual variation in those parameters necessary for safeguarding the bird resource.

STUDY AREA

Intensive study sites for this research unit are located along 1,100 miles of North Pacific coast from Forrester Island in southeastern Alaska to Unimak Pass and from there westward to the end of the Aleutian chain and northward to the Yukon Delta (Figure 1). OCSEAP-funded study sites will be established by us during 1976 at Constantine Harbor in

Hinchinbrook Entrance to Prince William Sound, Wooded Islands off the southern coast of Montague Island, Middleton Island, East Amatuli Island in the Barren Islands, Chowiet Island in the Semidi Islands, Ugaiushak Island and Big Koniuji Island both south of the Alaska Peninsula, Nelson Lagoon, Cape Peirce, and the Yukon Delta. Opportunistic sites will be at Unimak Pass, around Kodiak Island, and possibly on St. Matthew and Hall Islands if access is possible. Studies funded by the U. S. Fish and Wildlife Service, apart from the OCSEAP studies, will be done at Forrester Island in the extreme southwestern Alaska, the Copper River Delta, Valdez Arm of Prince William Sound, Amchitka Island, Buldir Island, Izembek Lagoon and Cold Bay, Kashumak River on the Yukon-Kuskokwim Delta, and Point McIntyre on the Beaufort Sea coast. Opportunistic studies by the Service, without OCSEAP funding, will be made in southeastern Alaska and along the southern side of the Kenai Peninsula.

METHODS

Information on breeding chronology, natality, mortality, productivity, and production of the dominant species of marine birds will be systematically collected primarily from areas of intensive study and secondarily from areas that are opportunistically visited. An important aspect of this research unit is that data collected over a wide geographic region will be analyzed in addition to the customary site specific analyses.

Study plots within both the intensive and opportunistic study areas will be located and described and photographed so that replicative censuses can be made by anyone at any subsequent time. Breeding success will be measured by following the fate of the clutch, eggs, and young. Mortality rates, causes of mortality, and the longevity of certain species can be measured by analyses of existing banding data (see 1976 Annual Report RU-340), and through additional banding of other species that will be done as part of the OCSEAP studies. Beached bird surveys will be conducted at all sites and will provide indexes to the numbers and kinds of dead or sick birds coming ashore, regardless of the reason, during the predevelopment period. Indexes of population abundance and sex and age composition for populations of marine and land birds will be derived from regularly conducted sea watches at the intensive sites and opportunistic counts at the other sites. Birds that are primarily collected for food analyses will be routinely examined for physiological condition, endo- and ectoparasites, and pathology in order to determine "normal" conditions in the dominant species.

RESULTS AND DISCUSSION

There are no substantial data to report for this period, but good information was collected on production at many locations about Kodiak Island and incidental observations were made at Unimak Pass and at localities where personnel aboard NOAA and USCG vessels were allowed to accompany shore parties ashore. These data are reported in various field and cruise reports (see 1976 Annual Report RU-337, Table 1). Much of the period was spent amassing unpublished data and published reports for synthesis into the final report.

Many study sites are necessary if the avian populations in the areas likely to be impacted by OCS development are to be adequately characterized. Figure 1 illustrates the distribution of study effort by OCSEAP and other programs, and Tables 1 and 2 indicate those species of marine birds that could be studied at those study sites (Note: there is no certainty that the species will be studied).

Numerous sites where concurrent studies are being conducted allows the characterization of both population dynamics and food habits over sizeable portions of many species' ranges. For species such as the glaucous-winged gull, black-legged kittiwake, common murre, and tufted puffin, considerable data will be acquired in each of several sites so as to adequately describe the species' biology while on land. For other species like the pigeon guillemot, common eider, black oystercatcher, and ancient murrelet, any single study site may not acquire sufficient data necessary for the characterization but in aggregate all of the sites could provide adequate data. Seldom before has an opportunity presented itself for regional studies of this nature within the same time period. Continued cooperation among all OCSEAP and nonOCSEAP investigators will be essential to achieving this regional characterization.

CONCLUSIONS

Conclusions will be deferred to subsequent reports.

SUMMARY OF 4TH QUARTER ACTIVITIES

Twelve OCSEAP-funded field camps will be established and operated either full-time or intermittently during the 4th quarter for the purpose of studying population dynamics and food habits of marine birds (Figure 1). A chartered fishing vessel, the Nordic Prince, will resupply most camps in the Gulf of Alaska and provide a platform for studies adjacent to the intensive study areas, collecting specimens for food habits, and making observations on seasonal density distribution (RU-337). An additional eight field camps that are funded by the U. S. Fish and Wildlife Service will be acquisitioning data that will be incorporated into our data base (Figure 1).

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Table 1. Relative abundance (A = Abundant; C = Common; O = Occasional; U = Uncommon) of birds at sites where ecological investigations of seabird colonies are being conducted by OCSEAP and other programs.

Species	SE Alaska	Southcentral Alaska						SW Alaska	
	Forrester Island	Copper River Delta	Egg Island	Hinchinbrook I.	Wooded Islands	Middleton I.	Barren Islands	Kodiak Island	Semidi Islands
Northern Fulmar							O		A
F-t. Storm Petrel	A				?		A		?
Leach's Storm Petrel	A								?
D-c. Cormorant					C	A			
Pelagic Cormorant	C							A	?
R-f. Cormorant							O		
Canada Goose		A	O						
Black Brant									
Emperor Goose									
Common Eider									
Glaucous Gull									
G-w. Gull	A	A	A	C	C	A	A	A	?
Bl-legged Kittiwake				A	A	A	A	A	A
Red-legged Kittiwake									
Arctic Tern		A	A						
Aleutian Tern									
Common Murre	A			A	?	A	A	A	A
Thick-billed Murre							U		
Black Guillemot									
Pigeon Guillemot	C				A		C	A	?
Marbled Murrelet									
Ancient Murrelet	A				?				
Cassin's Auklet	C								
Parakeet Auklet					C				
Crested Auklet									
Least Auklet									
Rhinoceros Auklet	A				O				
Horned Puffin	C			O	C		A	A	?
Tufted Puffin	A			C	A	A	A	A	A
Waterfowl - general		A							
Shorebirds - general		A							
OCSEAP-funded Study		FWS	Patten	FWS	FWS	FWS	FWS	FWS	FWS
Other-funded Study	FWS					FWS	FWS		

(Table continued).

Table 1. Continued.

Species	SW Alaska		Aleutian Islands			Southeastern Bering Sea				
	Ugaiu- shak I.	Big Kon- iui I.	Unimak Pass	Amchitka Island	Buldir Island	Izembek Lagoon	Nelson Lagoon	Cape Peirce	St. Geo- rge I.	St. Paul Island
Northern Fulmar					O				A	O
F-t. Storm Petrel	A				A					
Leach's Storm Petrel	C				A					
D-c. Cormorant	C							C		
Pelagic Cormorant	A	?			A			A	A	A
R-f. Cormorant	A	?			A			C	A	A
Canada Goose					A					
Black Brant										
Emperor Goose										
Common Eider					O	O	O	C		
Glaucous Gull										
G-w. Gull	A	A			C	A	A	A		
Bl-legged Kittiwake	A	O			A			A	A	A
Red-legged Kittiwake					A				A	O
Arctic Tern						C	A			
Aleutian Tern							O			
Common Murre	A	A			A			A	A	A
Thick-billed Murre					A				A	A
Black Guillemot										
Pigeon Guillemot	A	A			C			C		
Marbled Murrelet										
Ancient Murrelet		?			A					
Cassin's Auklet		A								
Parakeet Auklet		A							A	
Crested Auklet		A			A				A	C
Least Auklet					A				A	C
Rhinoceros Auklet										
Horned Puffin	A	A			C			A	A	
Tufted Puffin	A	A			A			A	A	A
Waterfowl - general						A	A			
Shorebirds - general						A	A	C		
OCSEAP-funded Study	FWS	FWS	FWS	FWS	FWS	FWS	FWS	FWS	Hickey	Hunt
Other-funded Study										

(Table continued).

Table 1. Continued.

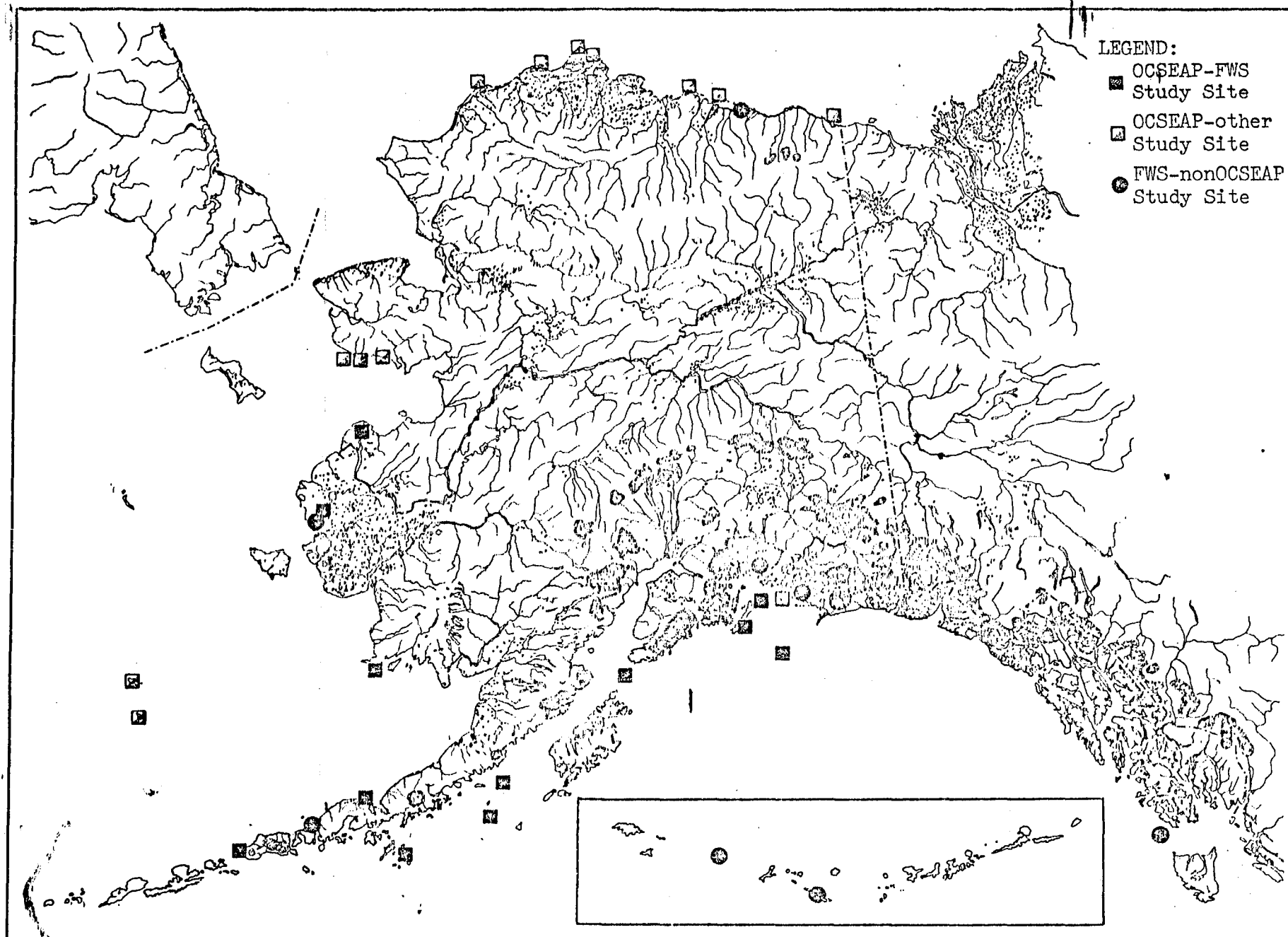
Species	Northeastern Bering Sea							
	Kashunuk River	Outer Yukon Delta	Sledge Island	Bluff	Safety Lagoon	King Island	St. Lawrence Island	Little Diomedes
Northern Fulmar								
F-t. Storm Petrel								
Leach's Storm Petrel								
D-c. Cormorant								
Pelagic Cormorant			C	C		A	A	A
R-f. Cormorant								
Canada Goose	A	A						
Black Brant	A	?						
Emperor Goose	A	?						
Common Eider								
Glaucous Gull	A	A	C	C		A	A	A
G-w. Gull	A	A						
Bl-legged Kittiwake			A	A		A	A	A
Red-legged Kittiwake								
Arctic Tern	A	A	A					
Aleutian Tern								
Common Murre			A	A		A	A	A
Thick-billed Murre			C	C		A	A	A
Black Guillemot								
Pigeon Guillemot			C	C		A	A	A
Marbled Murrelet								
Kittiwake's Murrelet Ancient Murrelet								
Cassin's Auklet								
Parakeet Auklet			C			A	A	A
Crested Auklet						A	A	A
Least Auklet						A	A	A
Whiskered Auklet Rhinceros Auklet								
Horned Puffin			C	C		A		A
Tufted Puffin			O	C		A		A
Waterfowl - general	A	A			C			
Shorebirds - general	A	A			C		A	
OCSEAP-funded Study	FWS	FWS	Drury	Drury	Drury	RFP?	RFP?	RFP?
Other-funded Study	FWS							

Table 1. Continued.

Species	Chukchi Sea			Beaufort Sea			
	N.Seward Peninsula	Cape Thompson	Cape Lisburne	Point Barrow	Cooper Island	Point McEntyre	Barrier Islands
Northern Fulmar							
F-t. Storm Petrel							
Leach's Storm Petrel							
D-c. Cormorant							
Pelagic Cormorant		C	C				
R-f. Cormorant							
Canada Goose	O						
Black Brant	C						Q
Emperor Goose	C						
Common Eider	C				O		A
Glaucous Gull	A	A	A		O		A
G-w. Gull							
Bl-legged Kittiwake		A	A				
Red-legged Kittiwake							
Arctic Tern	A				A		A
Aleutian Tern							
Common Murre		A	A				
Thick-billed Murre		A	A				
Black Guillemot		O	O		A		O
Pigeon Guillemot							
Marbled Murrelet							
Kittiwake Murrelet Ancient Murrelet							
Cassin's Auklet							
Parakeet Auklet							
Crested Auklet							
Least Auklet							
Wrinkled Auklet Rhinoseros Auklet							
Horned Puffin		A	A				
Tufted Puffin		A	A				
Waterfowl - general	A			C		A	O
Shorebirds - general	A			A		A	O
<hr/>							
OCSEAP-funded Study	RFP?	RFP?	RFP?	Connors	ADF&G		ADF&G
Other-funded Study						FWS	

Table 2. Number of studies of dominant species of birds in coastal Alaska during summer by program and by region, 1975-76.

Species	SE Alaska		Gulf Alaska		Aleutian Is.		Bering Sea		Chukchi Sea		Beaufort Sea	
	OCSEAP	Other	OCSEAP	Other	OCSEAP	Other	OCSEAP	Other	OCSEAP	Other	OCSEAP	Other
Northern Fulmar			2		1		2					
Fork-tailed Storm Petrel	1		2		1							
Leach's Storm Petrel	1		2		1							
Double-crested Cormorant			3				1					
Pelagic Cormorant	1		2		1		5					
Red-faced Cormorant			2		1		3					
Canada Goose					1		1	1				1
Black Brant							1	1			1	1
Emperor Goose							1					
Common Eider							2	1			2	
Glaucous Gull							3	1			2	1
Glaucous-winged Gull	1		8		1		4	1				
Black-legged Kittiwake			8		1		5					
Red-legged Kittiwake					1		2					
Arctic Tern							2	2			2	
Aleutian Tern							1					
Common Murre	1		6		1		5					
Thick-billed Murre					1		4					
Black Guillemot											2	
Pigeon Guillemot	1		5		1		3					
Marbled Murrelet												
Kittlitz's Murrelet												
Ancient Murrelet	1				1							
Cassin's Auklet	1		1									
Parakeet Auklet			2		1		2					
Crested Auklet			1		1		2					
Least Auklet					1		2					
Rhinoceros Auklet	1		1		1							
Horned Puffin	1		6		1		4					
Tufted Puffin	1		8		1		5					
Waterfowl - General							3	2			1	1
Shorebirds - General			1				4	2			2	1



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Map 1. Location of sites for studies of birds in coastal habitats by OCSEAP and other programs, 1975-76.