II. General Papers Session; Paul R. Kelly, Chairman;
1:30 - 5:10 p.m., 12 December

SEXUAL AND GEOGRAPHIC VARIATIONS IN BODY WEIGHT, CULMEN LENGTH, WING LENGTH, AND TARSUS LENGTH FOR COMMON MURRES IN THE BERING SEA

Haruo Ogi and Tokimi Tsujita
Research Institute of North Pacific Fisheries,
Faculty of Fisheries, Hokkaido University,
Hakodate, Hokkaido, Japan

Abstract: Morphological measurements were made on body weight, culmen, wing, and tarsal length of the Common Murre (Uria aalge). All these structures are essential for foraging behavior. A total of 636 Common Murres that were captured accidentally with gill-netted Pacific Salmon in the Bering Sea in 1973 were examined in this study. Murres were taken at 43 of 71 sampling stations. Common Murres were sampled mainly on the continental shelf and adjacent areas and not from the central part of the Bering Sea.

The results obtained are summarized as follows:

1. There was no significant difference in mean body weight between males and females. There was no sexual dimorphism in body weight at each sampling station. But the differences in the mean body weight were significant between stations. There was a general decrease in body weight at the sampling stations from north to south. There was sexual dimorphism in culmen length, but no geographical variation.

2. Neither sexual dimorphism nor geographic variation were found in wing length or tarsus length.

FOOD HABITS AND FOOD NICHE OVERLAP OF PISCIVOROUS MARINE BIRDS WINTERING ON MONTEREY BAY, CALIFORNIA

Donald M. Baltz
Graduate Group in Ecology,
University of California, Davis California

G. Victor Morejohn
Marine Laboratories,
Moss Landing California

Abstract: The stomach contents of 164 birds belonging to 17 species were examined. Commercially important species of fish and squid were found to be dominant items in the diets of most of the predator species. The Northern Anchovy (Engraulis mordax) and the Market Squid (Loligo opalescens) were preyed upon by all but two of the predator species studied. Measures of food niche overlap ($\hat{C}\lambda$) ranged from a low of 0.0041 to a high of 0.9689. High values of food niche overlap were mitigated by spatial and temporal segregation of congenerics. Low values of overlap between congenerics were related to predator size and trophic level. Intermediate values of food niche overlap were found between species which were not segregated by time, space, or trophic level.

FORAGING AND BREEDING ADAPTATIONS TO DIFFERENT FOOD REGIMES AMONG THREE SEABIRDS: THE ROYAL TERN, COMMON TERN, AND BLACK SKIMMER

R. Michael Erwin
Department of Zoology, University of Maryland,
College Park, Maryland
(Present Address: Massachusetts Cooperative Wildlife Research Unit,
University of Massachusetts, Amherst, Massachusetts)

Abstract: Aspects of the foraging and breeding ecology of the Royal Tern (Sterna (Thalasseus) maxima), Common Tern (S. hirundo), and Black Skimmer (Rynchops niger) were compared in light of the food resource. Field studies conducted in 1973 and 1974 on two Virginia barrier islands revealed species differences in foraging range and habitat use, flocking tendencies, and colony structure and distribution. These behavioral and ecological differences were examined in relation to different regimes of food predictability.

Analyses of inshore (<1.5 km) and offshore (>3.0 km) fish collections were conducted for several areas along the Delaware-Virginia coast. Spatial variability (between-sampling site) in fish abundance is much greater in offshore than inshore waters, indicating greater "patchiness" of fish.

In relation to this food distribution, the more "offshore"-feeding Royal Terns (1) foraged both solitarily and in flocks over surfacing fish, and (2) were the most "colonial" of the three species in regard to nest density, colony size, and colony distribution along the coast. In contrast, the strictly inshore-feeding Black Skimmer showed no flocking tendency and, in general, had smaller, more diffuse breeding colonies. Common Terns, which foraged both inshore and offshore, were intermediate in the 'degree of coloniality'. The suggestion by Horn (1968), Ward and Zahavi (1973) and Emlen (1975) concerning the advantages of food-finding among colonial birds are discussed in relation to the results.

ANTI-PREDATOR DEFENSE IN TWO SPECIES OF CORMORANT

Sherman Douglas Causey
Dept. of Ecological and Environmental Biology, University of California,
Irvine, California

Abstract: The anti-predator defense of the Double-crested Cormorant (Phalacrocorax auritus) and the Pelagic Cormorant (P. pelagicus) was observed on Mandarte Island, British Columbia, Canada. Approximately 500 Double-crested Cormorant nests and 150 Pelagic Cormorant nests were watched from 1 April to 1 August for a total of 250 hours of observation. The absolute location of nests on the island and the relative location of nests to each other were measured, as were nest dimensions, habitat parameters, and intrusions into the cormorant colonies by the Glaucous-winged Gull (Larus glaucescens) and the North-Western Crow (Corvus caurina). Preliminary results indicate that cormorants nesting in the colony positions that receive the highest frequency of predator intrusions are the most aggressive in that colony. Defense aggression in the cormorant colonies seems to be directly related to the frequency of intrusions, regardless of the predator or the mode of intrusion.

NESTING ECOLOGY OF THE ARCTIC LOON

Margaret R. Petersen
Division of Wildlife and Fisheries Biology, University of California, Davis, California

Abstract: Reproductive success of the Arctic Loon (Gavia arctica pacifica L.) was studied on the delta of the Yukon-Kuskokwim Rivers, Alaska in 1974 and 1975. Snow and ice melt was earlier than normal in 1974 and later than normal in 1975, and resulted in differences in dates of arrival of loons on ponds and in nest initiation. The numbers of nesting pairs and proportions hatching eggs varied markedly between years. Nesting pairs increased from 18 in 1974 to 59 in 1975. Nesting failure was substantial (94.4% in 1974 and 67.2% in 1975). Egg loss was attributed primarily to Red Fox (Vulpes fulva), jaegers (Stercorarius spp.), and Glaucous Gulls (Larus hyperboreus). Predation peaked immediately after the hatch of goose nests which had served as a major source of eggs for those predators. Only the earliest initiated loon nests were successful and those hatched at the time of last hatching of goose nests; all others were destroyed. Selection for island nest sites was an important factor in hatching success in 1975. 61.1% of the nests that hatched were island nests. These comprised only 36.2% of the total nests.

RESTORATION PROGRAM FOR ENDANGERED ALEUTIAN CANADA GEESE

G. V. Byrd
U.S. Fish and Wildlife Service, Adak, Alaska

P. F. Springer
U.S. Fish and Wildlife Service, Arcata, California

Abstract: Aleutian Canada Geese (Branta canadensis leucopareia) once nested in the Aleutian Islands, Alaska and in the Commander and Kurile Islands of the Soviet Union. Predation by Arctic Foxes (Alopex lagopus) introduced to the breeding islands was primarily responsible for reducing the bird to a single breeding population of approximately 800 birds.

The program to restore the bird to a safer level is discussed. The project includes a study of the breeding population of geese on Buldir Island, Alaska, the remote volcano where the geese still breed; captive propogation of geese; removal of introduced predators from selected islands and release of captive-raised birds; determination of migration routes and wintering areas and the study of geese in migration and wintering areas.

A summary of the results of studies to date is given and plans for the future are discussed.

THE SPRING BIRD MIGRATION AT PT. BARROW

Warren L. Flock
University of Colorado, Boulder, Colorado

Abstract: Previous radar studies of bird migration at Pt. Barrow did not provide good coverage of the spring migration, but this deficiency was largely remedied in the spring of 1974. Two types of migration are depicted by the radar record. Some species, especially eiders presumably, follow along the edge of the shorefast ice to the northeast from Pt. Barrow. Other species overfly the area without following the shoreline or edge of the shorefast ice very closely. A complication is that normal spring migration is to the east for some birds and to the west for others, each of these two groups tending to move when winds are favorable.

SEABIRDS OF THE NORTON SOUND AREA OF ALASKA

William H. Drury
Joint Scientific Staff, Massachusetts and National Audubon Societies

Abstract: The species of seabirds in the Norton Sound area contrast with that of the rest of the northern Bering Sea both in the predominance of Common Murres (Uria aalge) over Thick-billed Murres (Uria lomvia) and in the absence of Auklets. The contrast exists even between Sledge Island and King Island which are within sight of each other.

Differences in the physical characteristics of the breeding sites available do not seem to explain the sharp contrast. Some speculations are made about the characteristics of water masses which may be relevant.

A possible technique is described for measuring breeding success in Kittiwakes (Rissa sp.) from a small airplane. If effective, this may supply an efficient bio-assay for monitoring the "health" of a seabird colony.

OBSERVATIONS ON SEABIRD DENSITIES IN THE NORTHWESTERN PACIFIC OCEAN AND THE BERING SEA IN JUNE 1975

Terence R. Wahl
Bellingham, Washington

Abstract: Seabirds were observed on 127 transect periods of 15-60 minutes on a research/training cruise from Hokkaido to the Bering Sea and Kodiak.

Records of species and numbers within a set transect width, sea surface temperature, salinity and other environmental conditions were acquired and relationships of species and densities in the sub-artic convergence, the central north Pacific and the pelagic waters of the south central Bering Sea studied.

Some comparisons of records from this cruise and published records of other cruises in the general north Pacific area and comments on the distribution of various pelagic species are offered.

INFLUENZA VIRUS INFECTIONS IN ALASKAN SEABIRDS

B. C. Easterday, Susan J. Hyland and Jeanne A. Alexander
Department of Veterinary Science, University of Wisconsin,
Madison, Wisconsin

Abstract: Seventeen species of birds, mostly seabirds, were examined for the presence of influenza viruses and/or influenza virus antibodies in the summer of 1975 on St. Paul Island and at Point Barrow. Both live trapped and dead birds were examined. Type A influenza viruses were recovered from 4 species. Soviet collaborators have reported similar results in the western Pacific and Bering Sea. The significance of the finding in the ecology of influenza viruses is discussed.

Blue-footed Boobies

III. Symposium, Marine Charadriiformes; Joseph R. Jehl, Jr., Chairman, 8:10 - 12:00 a.m., 13 December

SYMPATRY AND INTERBREEDING OF HERRING & GLAUCOUS-WINGED GULLS IN SOUTHERN ALASKA

Samuel M. Patten, Jr.
Section of Ecology and Comparative Behavior, Dept. of Pathobiology, School of Hygiene and Public Health, The John Hopkins University, Baltimore, Maryland

Abstract: The Glaucous-winged Gull (Larus glaucescens) which breeds along the coast from Washington to the Aleutians, is quite closely related to the Herring Gull (Larus argentatus) which is a common and widely distributed species at the southern periphery of its coastal breeding range at Glacier Bay, Alaska. The Herring Gull replaces the Glaucous-winged Gull in interior Alaska, British Columbia, and the Yukon. The Glaucous-winged Gull is morphologically similar to the Herring Gull except that the black pigment on the tips of the primaries is replaced by a light grey that matches the rest of the mantle. Conversely, the iris of the Glaucous-winged Gull is darker than that of the Herring Gull. These two gulls are considered separate species in the A.O.U. Checklist of North American Birds (1957), but the ecological and taxonomic relationships between the two species have not been clearly defined. In some areas hybrids are common.

Rand (1948) suggests several populations of gulls may have been separated during Pleistocene glaciation. While these gulls may have shared a common gene pool at one time, enough evolution has occurred to account for certain observed morphological differences, e.g., the amount of melanin in the mantle plumage, primary feather pigmentation, iris and orbital ring color. The gulls are now expanding their ranges from Pleistocene "refuges" and where populations are in contact, hybridization occurs.

Williamson and Peyton (1963) collected a series of specimens intermediate in plumage characters between the Herring Gull and the Glaucous-winged Gull from the Cook Inlet region near Anchorage, Alaska. They suggested that sympatry between breeding Herring and Glaucous-winged Gulls occurs in southeastern Alaska. This paper will present interim results of research on sympatry and interbreeding of Herring and Glaucous-winged Gulls in south-central and southeastern Alaska, and will be illustrated with slides of mixed pairs, nesting habitat selection, and collected specimens.

Glacier Bay is recently deglaciated (less than 200 years). Gene flow between previously isolated populations in this area must be as recent as the deglaciation. Herring and Glaucous-winged Gulls have been found nesting in at least three colonies in Glacier Bay. The colonies are found on (1) a near vertic cliff; (2) a flat low gravelly island; and (3) sloping grassy hillsides. During the summer of 1971, suspected intermediates were observed at a cliff colony. These gulls showed intergradation from one form to the other in primary feather pigmentation. During the following two summers, mixed, conspecific as well as "intermediate" to Glaucous-winged Gull pairs were observed on North Marble Island in a colony of 500 pairs. Relative numbers

of Herring Gulls were low. The mixed, apparent backcross and "pure" pairs successfully fledged young. Some individual birds proved impossible to categorize. Primary feather pigmentation varied in both amount and pattern. Iris color varied apparently independently of primary feather pigmentation.

Dry Bay, Tongass National Forest, 75 km south of Yakutat, contains 500 paris of argentatus and glaucescens nesting sympatrically on low gravel bars at the mouth of the Alsek River. Dry Bay has apparently never been glaciated but may have been the location of catastrophic flooding within the last 1000 years from glacially dammed lakes in the interior Yukon. The Alsek River is a known migration route connecting coastal with interior populations of vertebrates through the St. Elias Range (15,000 -19,000 ft.) Collections of specimens in June 1974 and 1975 revealed both Herring Gull and Glaucous-winged Gulls are considerably higher in Dry Bay than Glacier Bay.

Haenke Island lies off Yakutat in Disenchantment Bay and has about 200 pairs of Glaucous-winged Gulls nesting on a 100 m grassy cliff. The St. Elias Range and the Malaspina Glacier prevent influence of interior conditions in the area. The gull population is more limited in primary feather pigmentation than Dry Bay. Haenke Island is located near the active front of the Hubbard Glacier; vegetation is dominated by alders, indicating a relatively recent deglaciation. Specimens collected in June 1974 indicate possible introgression from Dry Bay.

Apparently the largest Larus glaucescens colony in the northeast Gulf of Alaska is located on Egg Island near the mouth of the Copper River near Cordova. About 10,000 -12,000 gulls nest on this relatively large but low sandbar island composed of meadow-covered dunes. Gull specimens collected in the summer of '75 show a limited range of variability. The large number of glaucescens may serve to "swamp" argentatus type genes. Very recent earthquake activity ('64) is important in determining the structure of the island and the plant communities upon which gulls nest.

N.G. Smith (1966) suggests there are insufficient isolating mechanisms between the Herring and Glaucous-winged Gulls. Field evidence from this study indicates that the Larus argentatus - Larus glaucescens species group is in an exceptionally fluid state evolutionarily, with populations at least partially isolated by glaciation and mountain ranges now interbreeding where in contact and producing a variety of morphological types in a rapidly changing environment. Study is continuing to establish the extent of variation in the Glaucous-winged Gull, in the intermediate populations, and to document the full extent of the sympatric zone in the Gulf of Alaska.

HYBRIDIZATION BETWEEN WESTERN AND GLAUCOUS WINGED GULLS: IMPLICATIONS FOR SPECIATION THEORY

Wayne Hoffman
Department of Zoology,
Oregon State University

Abstract: The extent and frequency of hybridization between Western (Larus occidentalis) and Glaucous-winged Gulls (Larus glaucescens) were studied on Destruction Island, Washington, in 1971-74 and were surveyed on the rest of the Washington and northern Oregon Coasts in 1975. Hybridization was regular and common over most of that range.

Analysis of 1974 nesting success on Destruction Island indicates that pairs including at least one intergrade laid more eggs and hatched a higher percentage of their eggs than pure Western or pure Glaucous-winged Gull pairs.

The patterns of mate choice at Destruction Island were analyzed with a hybrid index and also by a multivariate method using Manhatten distance. Both indicated that the mating patterns were strongly associative.

The results of the nesting success analysis indicate an evolutionary force tending to increase the rate of hybridization, and the mating pattern analysis indicates a force decreasing the rate of hybridization. This suggests that a dynamic equilibrium involving the maintenance of an intermediate hybridization may exist.

Present speciation theory does not recognize such a possibility. Preliminary results of a simulation of the system indicate that such an intermediate equilibrium exists.

COLONY TURNOVER AND HYBRIDIZATION IN SOME CANADIAN ARCTIC GULLS

Brian Knudsen
Department of Zoology, University of Manitoba,
Winnepeg, Manitoba

Abstract: Some data were collected in mid-June 1975 on the location and composition of 5 gull colonies in Home Bay, Baffin Island. In the 14 years since these colonies were last studied, at least 5 colonies apparently have been abandoned, 3 new colonies have been formed, and 1 colony has been reduced to 4 pairs.

Four collected gulls appear, on the basis of measurements, iris colours, and plumage patterns, to be hybrids between Larus thayeri and L. glaucoides. Mixed pairs of these two species were also seen.

Seven pairs of L. argentatus (1 specimen collected), a species formerly reported to nest only on level ground in this area, were nesting on a vertical cliff in the same colony with L. thayeri, L. glaucoides, and L. Hyperboreus.

ABNORMAL PAIRING IN WESTERN GULLS

George L. Hunt Jr. and Molly W. Hunt
Department of Ecology and Evolutionary Biology,
University of California, Irvine

Abstract: During the breeding seasons of 1972-1975 approximately 10-15% of Western Gull (Larus occidentalis) nests on Santa Barbara Island, California, contained four, five or six eggs, up to double the normal clutch size. The supernormal clutches are attributed to pairs in which both individuals are female and both lay eggs. Of 12 pairs and 10 individual birds trapped incubating supernormal clutches and sexed by laparotomy or dissection, all but one bird were female. Fertility was very low in these clutches, the eggs were smaller than those produced by male-female pairs, and the laying sequence indicated that eggs must have been laid by two birds. Prior to egg laying, members of female-female pairs spent less time at the territory than male-female pairs, were less aggressive in territorial defense and were not observed to engage in courtship feeding or copulation with each other. Fertilization of a few eggs probably took place in "extramarital" matings.

Analyses of egg contents for pesticide residues indicated that levels of DDE and PCB's were not abnormally high and no differences were found in residue levels between normal and supernormal clutches. The reasons for the abnormal female-female pairing in Western Gulls are not presently known.

A DISCUSSION OF THE TAXONOMY AND EVOLUTION OF SOME DARK-BACKED GULLS OF THE GENUS LARUS

Ron LeValley
Biology Department,
Humbolt State University,
Arcata, California

Abstract: Recent investigations by myself and others have indicated that the Yellow-footed Western Gull (Larus occidentalis livens) of the Gulf of California may be more closely related to the Kelp Gull (L. dominicanus) of the southern hemisphere than to the Western Gull (L. occidentalis). This assumption has proposed some questions concerning the evolutionary relationships of these large dark-backed gulls with each other and with other large gulls of the genus Larus. As a result I have been examining the plumage sequences and distribution of the Greater Black-backed Gull (L. marinus) and the Lesser Black-backed Gull (L. fuscus) as well as the forms mentioned above.

Consideration of such factors as plumage sequence, size, distribution and general ecology has revealed that the Kelp Gull is not closely related to the Greater Black-backed Gull as has been suggested by some authors. Based on these considerations, a discussion of the evolutionary relationships of these dark-backed gulls should be instructive.

MORPHOLOGICAL VARIATION, SPECIES LIMITS, AND EVOLUTION IN THE MURRELET GENUS ENDOMYCHURA

Joseph R. Jehl, Jr. and Suzanne I. Bond
Natural History Museum,
San Diego, California

Abstract: Species limits in Endomychura have been a matter of dispute. Recent field studies in Baja California have shown that the probable breeding ranges of two of the three currently recognized taxa are more extensive than has been realized, and that all three taxa occur on the San Benito Islands during the nesting season. Morphological data indicate that Craveri's Murrelet (E. craveri) is acting as a distinct species with respect to both forms of Xantus' Murrelet (E. hypoleuca). Endomychura h. hypleuca and E. h. scrippsi are exceptionally well-marked forms and differ significantly in size and plumage characters. They apparently hybridize on the San Benitos, but the limited data suggest that interbreeding is not random, that gene flow between the two is reduced. Possible isolating mechanisms are discussed. Trends in body size in this genus are clinal, and the Ancient Murrelet (Synthiloboramphus antiquus), which is closely related to Endomychura, also fits into the general picture of morphological variation.

THE BREEDING BIOLOGY OF THE XANTUS MURRELET

Aoe Eppley, Doug Schwartz, Sandy Anthony and George L. Hunt
Department of Ecological and Environmental Biology,
University of California, Irvine

Abstract: During the spring of 1975, the breeding biology of the Xantus Murrelet (Endomychura hypoleuca) was studied on Santa Barbara Island, California. Fifty-four Xantus Murrelet nests were observed from 18 April until they were vacated. Habitats selected for nests were recorded and the distance of nests from the water measured. Observations of parent-chick interactions were made on one nest for 18 hours. Nine nests were observed at night to document chick departures. Hatching success in 33 nests was 54% and of 29 chicks hatched, 100% were believed to have successfully left the island. Mouse predation on Xantus Murrelet eggs was found to significantly reduce the number of young produced.

THE FOSSIL RECORD AND ALCID EVOLUTION

G. Victor Morejohn
Moss Landing Marine Laboratories,
Moss Landing, California

Abstract: The western north Pacific coastal region apparently has been the area of origin of many of the species of Alcidae. Few of the living taxa of the north Pacific and north Atlantic regions have fossil representatives earlier than Pleistocene. Several alcid species became extinct prior to Pleistocene times, notably the flightless Lucas auks (Mancalla spp.) of the Pliocene that had evolved from late miocene ancestors (Premancalla). Recent discoveries in Santa Cruz reveal two species of southern California Pliocene Lucas auks, a rhinocerus auklet (Cerorhinca), and a new larger species of late Miocene Premancalla. Based on present distribution of living alcids and site localities of known fossils of the north Pacific and north Atlantic coastal regions, a tentative phylogeny of alcids is presented.

IV. General Papers Session; Paul R. Kelly, Chairman;
2:45 - 5:45 p.m., 13 December

SEX ROLES, SOCIAL STRUCTURE AND THE ROLE OF ENVIRONMENT IN THE WESTERN GULL

Raymond Pierotti
Department of Biological Sciences,
California State University, Sacramento

Abstract: The evolution of social strucutres and the selective forces favoring those structures have long been the source of controversy and the subject of considerable research. Recently there have been some noble efforts to place the evolution of sociality in a theoretical framework (Trivers 1972, Alexander 1974). These models, though elegant in formulation, have not been adequately tested in the field.

It was decided, therefore to test these theories by comparing separate breeding colonies of the Western Gull (Larus occidentalis). Time and energy budgets were taken for male and female gulls to evaluate their respective roles in parental care. These in turn were compared with various environmental parameters that might effect social behavior such as food supply, predation, and available space for nesting. Finally the social systems observed in the different colonies were evaluated in terms of the models of Trivers and Alexander.

COMPARISON OF VOCAL DIFFERENCES IN THE LONG CALL OF SELECTED POPULATIONS OF EASTERN PACIFIC GULLS (L. OCCIDENTALIS, L. DOMINICANUS, L. GLAUCESCENS)

Judith Latta Hand
Biology Department,
University of California, Los Angeles

Abstract: There is evidence that male passerines respond selectively to the vocalization (songs) of males of their own species. There is accumulating indirect evidence that female passerines are equally discriminating and that female choice based on recognition of conspecific song is a mechanism of species isolation. M.P. Harris (1970) felt that his data from a study in which mating choices of cross fostered young of L. argentatus and L. fuscus were recorded, are best explained by a mechanism based on female choice, presumably determined by imprinting on key features during early stages in the nest. R.G.B. Brown (1967), in a study of these same two species, concluded that mantle color was used as a species-distinguishing feature by females, but also left open the possibility that females might distinguish species on the basis of vocal differences in the Long Call as well.

Sonograms of the Long Call notes of Larus occidentalis occidentalis (S.E. Farallon Island), L. occidentalis wymani (Catalina Island), L. occidentalis livens (Gulf of California), L. glaucescens (Mandarte Island, B.C.) and L. dominicanus (Chile) were made. Only two populations, that of L. o. occidentalis and L. o. wymani show any close similarities. The voice of L. o. livens is as different from wymani and occidentalis as either of those two populations are from L. glaucescens or L. dominicanus.

This marked difference in voice of L. o. livens from both L. o. wymani and L. o. occidentalis is a trait which strongly distinguishes the former populations from the latter, and suggests the possibility that the vocalizations may serve as an isolating mechanism.

OCCURRENCE AND MIGRATION OF THE LONG-TAILED JAEGER IN NORTH AMERICA

Philip Unitt
San Diego, California

Abstract: A study was made of the distribution of the Long-tailed Jaeger (Stercorarius longicaudus) in North America away from its breeding grounds involving an analysis of the records in the literature. The evidence suggests the existence of an overland migration route at high altitudes in both spring and fall. Most spring records are interior; there is very little spring migration on the Pacific coast from California to British Columbia. In fall, migration takes place both through much of the interior and offshore along the Pacific and Atlantic coasts. There is no unequivocal evidence for winter occurrence in or near North America.

BREEDING BIOLOGY OF THE CALIFORNIA LEAST TERN

Barbara W. Massey
Long Beach, California

Abstract: The California Least Tern (Sterna albifrons browni Mearns) beeds on beaches and saltflats close to estuaries in southern California and Baja California, Mexico. Severe loss of habitat has reduced the subspecies to approximately 600 breeding pairs in the United States. It was placed on the endangered species list in 1970.

The breeding biology and behavior of the California Least Tern were studied for several nesting seasons in Orange County colonies. The demography of a nesting colony was documented, including number of nests, clutch size, weights and measurements of eggs. Courtship displays, nest-making, egg-laying, incubation, hatching, growth and development of chicks, first flights of chicks, and vocalizations of adults and chicks were all studied. Banding of newly hatched chicks was an essential part of the program. Data gathered in this study have been valuable in subsequent efforts to protect the California Least Tern as a breeding bird in the United States.

EVIDENCE OF SURVIVAL TO RECENT TIMES OF THE EXTINCT FLIGHTLESS DUCK, CHENDYTES LAWI

G. Victor Morejohn
Moss Landing Marine Laboratories
Moss Landing, California

Abstract: Skeletal remains of the extinct Pleistocene diving duck, Chendytes lawi, were discovered at two northern California Indian midden sites. This bird was known to live on the Channel Islands off southern California to at least 33,000 years ago. Carbon 14 dates of midden shell and aspartic acid racemization of the Chendytes bones showed that this species lived into the Holocene and became extinct

sometime after 3780 years ago. The remains of Chendytes lawi bones from these northern California middens and a newly discovered Pleistocene tibiotarsus from the Port Orford Formation (lower Pleistocene) of Oregon extend the known range of Chendytes lawi from the Channel Islands off southern California northward some 450 miles. The high frequency of occurrence of bones of this species at one Indian midden clearly implicates early California aboriginal man as playing an important role in its extinction.

SOME PRELIMINARY FINDINGS IN THE ANALYSIS OF BIRD BONES FROM SELECTED CALIFORNIA INDIAN MIDDENS

Diana G. Matthiesen
Museum of Birds and Mammals, Biology Department,
San Jose State University, San Jose California

Abstract: Analysis of non-human vertebrate remains from Indian habitation sites has been a somewhat neglected aspect of the study of prehistory. In this age of increasing environmental awareness, the value of these remains for reavealing geologically recent environmental change is becoming rapidly evident. With this in mind, bird, as well as fish, mammal, and molluscan remains, from a number of sites are currently being studied.

Presented here are the results of work done on avian remains at the Laguna Creek Indian midden (SCr-7) on the central California coast. The site is described in terms of its geological history, probable mode of formation, past and present avian assemblages, and importance. Some inferences are drawn as to dietary preferences and possible hunting techniques from the kind and condition of the remains.

Notable findings include the abundant remains of the now extinct flightless scoter, Chendytes lawi, the nearly extinct Short-tailed Albatross, Diomedia albatrus, and the endangered Clapper Rail, Rallus longirostris. The Laguna Creek remains are then compared temporally and ecologically with those of six other California middens.

It is clear from these comparisons that major environmental changes have occurred in some of these areas. Most of these changes are not surprising, and the causes for them are obvious; but other present an enigma to the researcher and call for more intensive investigation on a broad interdisciplinary front.

THE COLONIAL BIRD REGISTER

Donald A. McCrimmon
Cornell Laboratory of Ornithology, Ithaca, New York

Abstract: Throughout North and Central America and the Caribbean, more than 70 species of birds nest in colonies. Colonial birds are heavily dependent on a variety of wetland habitats that are extremely important to man and under considerable pressure for development. Numerous agencies and individuals have long been interested in monitoring and protecting colonially nesting birds, but before the establishment of the Colonial Bird Register the information collected was not centralized for convenient access and effective use.

The National Audubon Society and the Cornell Laboratory of Ornithology organized the Colonial Bird Register to establish a computerized data base for the collection and dissemination of information concerning colonial birds. Individual and agencies working with colonially nesting species are asked to contribute to the success of the program by submitting, to the Register, field survey forms detailing the location of colonies, their sizes, species composition, habitat, disturbance factors, and other information.

BREEDING AVIFAUNA OF THE BARREN ISLANDS, ALASKA

Edgar Bailey
U.S. Fish and Wildlife Service,
Anchorage, Alaska

Abstract: The Barren Islands, located at the entrance of Cook Inlet 180 miles southwest of Anchorage, were visited in July 1974 and 1975. All seven islands were surveyed by both boat and at least partly afoot during the 3 weeks in the islands.

The main purpose of the survey was to determine species composition, distribution, and abundance of mammals of the islands, a proposed National Wildlife Refuge.

A total of 55 species of birds, including an estimated minimum of 500,000 nesting seabirds, was recorded among the island which comprise 10,000 acres of land. Tufted (Lunda cirrhata) and Horned Puffin (Fratercula corniculata), Common Murre (Uria aalge), Black-legged Kittiwake (Rissa tridactula), Glaucous-winged Gull (Larus glaucescens), Forked-tailed storm Petrel (Oceanodroma furcata), Parakeet Auklet (Cyclorrhynchus psittacula), and Red-faced Cormorant (Phalacrocorax urile), were the most common nesters. Sooty Shearwaters (Puffinus griseus) and Northern Phalaropes (Lobipes lobatus) were abundant well offshore.

Greatest seabird numbers exist on East Amatuli Island where a small Northern Fulmar (Fulmarus glacialis) colony also was found and where Kittlitz's Murrelet (Brachyramphus brevirostre) apparently nests. Approximately 500 pairs of Rhinoceros Auklets (Cerorchinca monocerata), the only colony described outside of Southeast Alaska, were discovered on Sud Island. Introduced foxes evidently have reduced bird populations on Ushagat Island, the largest of the Barrens.

THE BIRDS OF BOGOSLOF ISLAND: A RECENTLY ACTIVE VOLCANO

C. V. BYRD
U.S. Fish and Wildlife Service, Adak, Alaska

G. J. Divoky
Alaska Dept. of Fish and Game,
Fairbanks, Alaska

Abstract: Bogoslof Island, located in the southeast Bering Sea, is a recently active volcano that first rose from the sea in 1796. Visits to the island have been frequent enough to ascertain approximate dates of colonization and estimates of numbers of breeding birds. A visit in 1973 showed 15 species of birds nesting on the island.

Thick-billed Murres (Uria Lomvia) colonized the island soon after its appearance and were much more abundant 50 years ago than now because erosion of cliffs has decreased nesting space. Pigeon Guillemotes (Cepphus columba) were abundant in the early 1800's but the erosion of the boulder beaches they used for nest sites has reduced the population to one or two pairs.

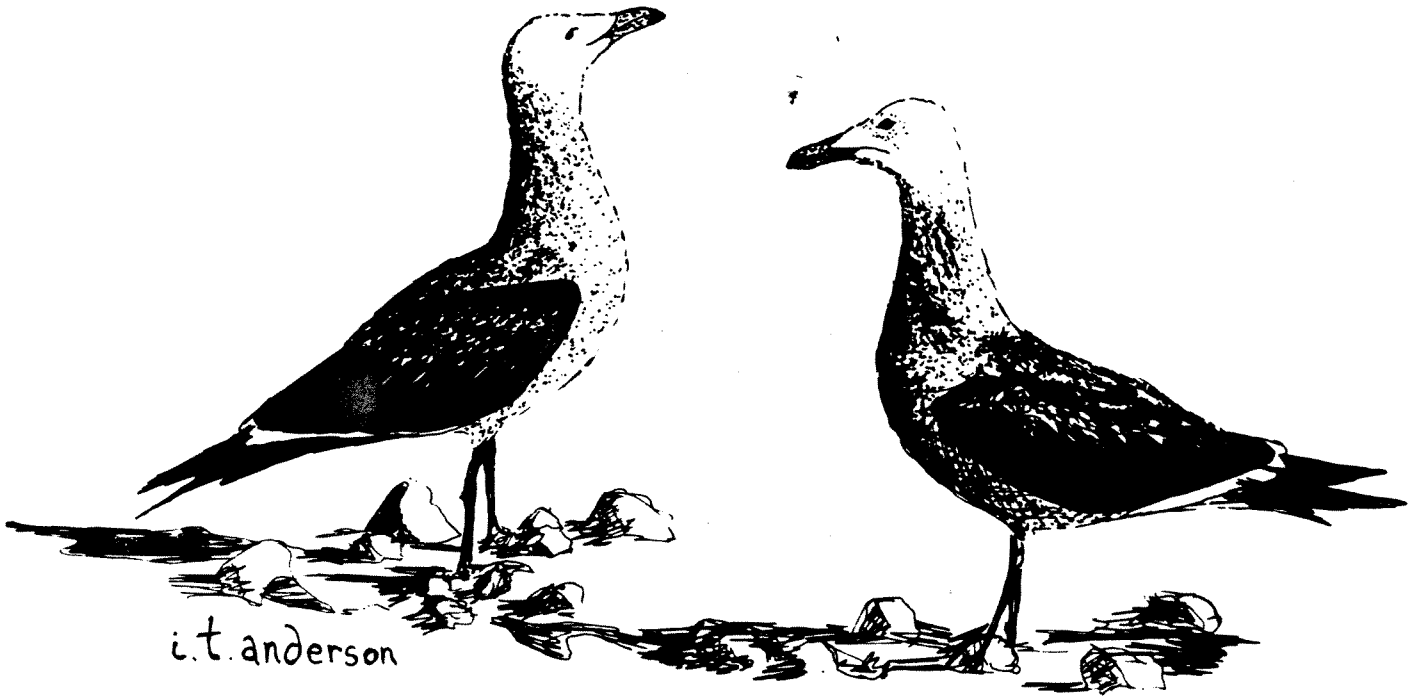
From the 1930's to the present time vegetation has covered much of the island and by providing nesting material has resulted in an increase of Glaucous-winged Gulls (Larus glaucescens). Stabilization of soil by vegetation has provided burrowing habitat for Fork-tailed Storm-Petrels (Oceanodroma furcata) and Tufted Puffins (Lunda cirrhata), both of which have increased greatly in the past 30 years. Red-legged Kittiwakes (Rissa brevirostris) were not known to nest on the island before 1973 when approximately 100 pairs were found. Colonization of the island by other seabirds is discussed.

SEABIRD SURVEYS ON MONTEREY BAY, OCTOBER 1973 TO THE PRESENT

Robert Gill and Bruce Elliot
Wildlife Management Branch,
California Department of Fish and Game

Abstract: Between 17 October and the present, biologists from the State of California's Moss Landing Marine Lab and the Department of Fish and Game have conducted on-going cooperative seabird surveys on Monterey Bay. Fifteen regular 30-mile transects, plus eleven supplementary trips covering a portion or portions of the former route, and totaling over 800 cruise miles and approximately 156 hours of observation time have permitted observations of seabird migration patterns, feeding assemblages, and wintering distribution patterns on waters over and around the Monterey Submarine Canyon. Records spanned every month of the year, but emphasized late autumn, winter and early spring, those portions of the year for which seabird data in this area is particularly scarce. Data on water depth, temperature and local weather were gathered for correlation with observational data and food habit information gathered from specimen. General patterns of distribution and abundance are outlined and summarized, indicating that patterns of distribution even in this limited area are more complex than originally suspected and not firmly related to local weather factors or other factors analyzed to date.

Magnificent Frigatebird



Heermann's Gulls

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The sketches found in this issue were drawn by Irene Trautt Anderson, and they represent some of the commonly found seabirds of marine habitats in the Gulf of California.

D. W. A.
30 July 1976

PACIFIC SEABIRD GROUP

DEDICATED TO THE STUDY AND CONSERVATION OF PACIFIC SEABIRDS AND THEIR ENVIRONMENT