

due to the short period of open water and the long nesting period (approximately 68 days) of the species. The chick produced from an egg laid after 18 July would not be able to leave the nest until the last week in September. By mid-September inshore waters can be frozen and snow coverage can be extensive. On the 10 September visit, snow was drifted around the nest structure and the parents had pushed it away to gain access to the nest. An insufficient period of open water is the apparent reason for the absence of breeding Black Guillemots in the western Canadian Archipelago (Storer 1952:198).

East of Barrow the Black Guillemot is uncommon. Though Storer (1952:200, fig. 17) shows the breeding range of the species extending east along the Beaufort Sea coast to Canada, our nesting records are the first from the Beaufort Sea. Pelagic observations show the Black Guillemot to be common in the Chukchi Sea (Divoky 1972; Watson and Divoky 1972), but rare in the Beaufort Sea except near Barrow (Frame 1973; Watson and Divoky, unpubl. data). We visited 20 islands east of Igalik, but while suitable debris was present on many islands, no evidence of Black Guillemot nesting was found. Our only sightings east of Igalik were of a single bird at Alaska Island on 21 July 1971 and two birds were seen at Flaxman Island on 6 August 1972. There are only two other records for the inshore waters of the Beaufort Sea: Fiscus (Gabrielson and Lincoln 1959:484) saw a single bird off Cape Halkett on 22 August 1952, and Hall (1972) saw one at Oliktok Point on 16 July 1971. Human activity on the Beaufort Sea coast has increased greatly in recent years and man's wasteful littering practices may provide nest sites which could extend the breeding range of the Black Guillemot eastward.

Transportation to the islands was provided by helicopters from the USCG icebreakers *Glacier*, *Staten Island*, and *Northwind*. We are grateful to the captains, officers, and crews of these ships for their support. Partial funding for Smithsonian participation in the Western Beaufort Sea Ecological Cruise (WEBSEC 72) aboard the *Glacier* was provided by the Humble Oil and Refining Company now called Exxon Company, U.S.A.

## SYMPATRY AND INTERBREEDING OF HERRING AND GLAUCOUS-WINGED GULLS IN SOUTHEASTERN ALASKA

SAM PATTEN, JR. AND A. R. WEISBROD

U.S. National Park Service Resource Group  
College of Forest Resources AR-10  
University of Washington  
Seattle, Washington 98195

Williamson and Peyton (Condor 65:24, 1963) collected a series of specimens intermediate in plumage characters between the Herring Gull (*Larus argentatus*) and the Glaucous-winged Gull (*Larus glaucescens*) from the Cook Inlet region near Anchorage, Alaska. The authors suggested that sympatry between breeding Herring and Glaucous-winged Gulls may also occur in southeastern Alaska. This report presents evidence for interbreeding in another region of sympatry.

## LITERATURE CITED

- BAILEY, A. M. 1948. Birds of arctic Alaska. Colorado Mus. Nat. Hist., Popular Ser. 8:1-317.
- DIVOKY, G. J. 1972. The pelagic birds and mammals of the Chukchi Sea in fall. Unpublished M.S. Thesis, Michigan State Univ., East Lansing.
- FRAME, G. W. 1973. Occurrence of birds in the Beaufort Sea, Summer 1969. Auk 90:552-563.
- GABRIELSON, I. N., AND F. C. LINCOLN. 1959. The birds of Alaska. The Stackpole Co., Harrisburg, Pa., and Wildl. Mgmt. Inst., Washington, D.C.
- HALL, G. E. 1972. A summary of observations at Oliktok Point-summer 1971, p. 245-275. In P. J. Kinney, D. M. Schell, V. Alexander, D. C. Burrell, R. Cooney, and A. S. Naidu [eds.], Baseline data study of the Alaskan arctic aquatic environment, Univ. of Alaska Inst. Marine Sci. Rept. R72-3. 275 p.
- KAFTANOVSKIĬ, Y. M. 1951. Chistikovyte ptitsy vostochnoi Atlantiki (Alcids of the eastern Atlantic). Materialy k Poznaniyu Fauna i Flory SSSR. Nov. Ser. Odt. Zool. 28:1-170.
- LARSON, S. 1960. On the influence of the arctic fox *Alopex lagopus* on the distribution of arctic birds. Oikos 11:276-305.
- MACLEAN, S. F., JR., AND N. A. M. VERBEEK. 1968. Nesting of the Black Guillemot at Point Barrow, Alaska. Auk 85:139-140.
- PRESTON, W. C. 1968. Breeding ecology and social behavior of the Black Guillemot, *Cephus grylle*. Ph.D. Thesis, Univ. Michigan, Ann Arbor.
- STORER, R. W. 1952. A comparison of variation, behavior, and evolution in the sea bird genera *Uria* and *Cephus*. Univ. California Publ. Zool. 52: 121-222.
- SWARTZ, L. G. 1966. Sea-cliff birds, p. 611-678. In N. J. Wilimovsky and J. N. Wolfe [eds.], Environment of the Cape Thompson region, Alaska. U.S. Atomic Energy Comm. Div. Tech. Inf. 1250 p.
- WATSON, G. E., AND G. J. DIVOKY. 1972. Pelagic bird and mammal observations in the eastern Chukchi Sea, early fall 1970. U.S. Coast Guard Oceanographic Rept. 50:111-172, 90a-129a.
- WINN, H. E. 1950. The Black Guillemots of Kent Island, Bay of Fundy. Auk 67:477-485.

Accepted for publication 28 June 1973.

We spent the summers of 1971 and 1972 studying the marine avifauna of Glacier Bay National Monument in southeastern Alaska, where we found Herring and Glaucous-winged Gulls nesting together in at least three colonies. Other gull colonies within the Monument have not been investigated. These three colonies are located at Johns Hopkins Inlet, at Tlingit Point, and on North Marble Island. The colonies are found respectively on (1) a near vertical cliff; (2) a flat, low, gravelly island; and (3) sloping grassy hillsides.

During the summer of 1971, suspected intermediates were observed for several hours at the Johns Hopkins Inlet cliff colony. These gulls showed complete integration from one form to the other in primary feather pigmentation. The following summer, 157 nest sites of gulls were studied on North Marble Island, and examination of the nest sites on North Marble Island revealed the following pairs: 152 apparent Glaucous-winged Gull pairs; 1 Herring Gull pair; 1 "typical" Herring Gull paired with a

TABLE 1. Characteristics of four adult gulls collected from North Marble Island, Glacier Bay National Monument, Alaska.

	Iris	Eye-ring	Legs and feet	Inside of mouth	Tips of primaries	Sex	Gonad size (mm)
Intermediates							
1	Mottled brownish yellow	Flesh	Pale flesh	Flesh	Gray, much darker than mantle	Male	20 × 10
2	Pale yellowish gray	Flesh	Flesh pale	Flesh	Gray, much darker than mantle	Male	24 × 13
3	Brownish gray-yellow	Pink	Pale flesh-gray	Flesh	Gray, much darker than mantle	Male	20 × 16
Herring	4 Clear yellow	Yellow	Pale flesh	Flesh	Black	Male	25 × 20
Glaucous-winged (typical)							
Herring (typical)	Yellow	Yellow	Pale flesh	Flesh	Black		

Colors adopted from R. Palmer, Handbook of North American birds, Vol. 1, 1962.

“typical” Glaucous-winged Gull; and 3 apparent “backcross” pairs (“intermediate” paired with Glaucous-winged Gull). The mixed, apparent backcross, and “pure” pairs successfully fledged young.

Permission was granted by Monument officials to collect only four adult gulls at the close of the nesting season. Three of the four gulls were intermediate with respect to primary pigmentation and eye color (table 1). The fourth bird collected was a Herring Gull. The amount of variation in primary feather pigmentation, in the iris color, and in the eye-ring color suggests the problem is more complicated than simple hybridization. Birds number 1, 2, and 4 were known to have been paired with Glaucous-winged Gulls.

N. G. Smith (A.O.U. Ornithol. Monogr. no. 4, 1966) suggests there are insufficient isolating mechanisms between the Herring and Glaucous-winged Gulls. Our field evidence confirms that this is the case for species recognition and nesting habitat selection in the Glacier Bay region. Further study is necessary to establish the extent of variation in primary pigmentation and iris and eye-ring color contrast in the Glaucous-winged Gull. Thereafter the extent of the sympatric zone in the Gulf of Alaska should be explored.

This study was conducted under contract No. 14-10-9-900-375 from the National Park Service to the University of Washington.

Accepted for publication 14 March 1973.

## ECOLOGICAL STUDIES OF THE PLUMES OF THE PEACOCK (*PAVO CRISTATUS*)

INDRA KUMAR SHARMA

Bhagwati Bhavan  
Ratanda Road  
Jodhpur 20, India

Plumes of the Peacock (*Pavo cristatus*) have been popular since ancient times because they are charmingly colorful; they also have economic value. Some ornithologists have given general descriptions of Peacock, or Peafowl, plumes but they have not studied their general details and ecological aspects. Messurier (1904) states that the length of plumes varies from 100 to 120 cm, while Whistler (1949) states that the length is about 115 cm. Ali (1961) mentions that upper tail coverts measure about 120 cm. Baker (1930) states that upper tail coverts are smaller in size but with definite ocelli; that lower coverts are larger in size, shaped like a quarter-moon, without ocelli; and that outer coverts also lack ocelli. Dharamkumarsinghi (1956) mentions that plumes are molted in September. They begin to develop in the second year and attain full size in the fourth year.

## STUDY AREA

Observations were made at Jodhpur, which is situated at 26°N and 73°E, at an altitude of 243 m M.S.L. This is a semi-arid area, with large green patches of farms and gardens. Annual rainfall is 365 mm. Rains occur mainly during the monsoon (260 mm) in July and August. Maximum temperature in June is about 45°C and the minimum in January is 4°C.

## METHODS

Various typical habitats of the Peafowl were selected for the study in a radius of 15 km around Jodhpur. Observations were made during 1971 and 1972. To collect precise data on the rate of molt and development of plumes, individual Peacocks were kept in separate cages.

## TIMING OF MOLT

In the fourth week of August some Peacock plumes began to loosen and swing suspended. Because the loose plumes cause irritation, Peacocks removed them with their bills. They often preened their train of plumes, plucking out the loose ones. The rate of molt was very slow in the first week, i.e., three to six plumes per day. Molting increased in the second week to 6–21 feathers per day, and this continued through the fourth week. During the fifth and sixth