

## MIGRATORY SHOREBIRD POPULATIONS ON THE COPPER RIVER DELTA AND EASTERN PRINCE WILLIAM SOUND, ALASKA

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**ABSTRACT.**—The spectacular concentrations of shorebirds moving north through the Copper River Delta and eastern Prince William Sound areas of southern Alaska are described. These are critical staging areas for a number of long-distance migrants and take on special interest now for conservation and environmental agencies with the development of a major oil terminal at nearby Valdez. It is estimated that this sector of the Alaskan coast is host to 20 million shorebirds each spring, the bulk of them being Western Sandpipers and Dunlins. The fall migration is not striking, being spread out over more time and over a greater diversity and quantity of habitat suitable for shorebirds.

The major portion of Nearctic shorebirds breeding in western Alaska utilize a narrow coastal migration corridor while en route north from their wintering grounds. Shorebird species that utilize this route are found wintering from southern Alaska to Terra del Fuego. Most shorebirds migrating north to the arctic and subarctic by way of the western slope of North America are confronted with a combination of topographic and climatic restrictions when entering the Pacific Northwest coast of British Columbia and southeastern Alaska. Snow-covered and glaciated mountain ranges rise abruptly from the sea, leaving little or no tidelands and marshes suitable for feeding and resting shorebirds. In addition, during the months of April and May, the region is still exposed to an easterly movement of frequent cyclonic storms. Thus, shorebird migrations are often hampered.

As birds progress north, the open sweep of the Pacific Ocean ends abruptly near 60 degrees north latitude in the northern rim of the Gulf of Alaska. Many shorebirds entering into this region have traveled in excess of 1500 km since encountering an abundance of good foraging habitats. Many of these birds have to travel another 1000 km or more to breeding habitats. The additional distance, at times over mountain ranges, will include overland flights of hundreds of kilometers.

Migrant shorebirds entering coastal central southern Alaska are confronted with two notable topographic obstacles: the St. Elias, Chugach and Kenai contiguous mountain ranges in a northern arc bending from the southeast to the southwest; and beyond these, the Alaskan and Aleutian ranges. These ranges contain the highest mountains and largest ice fields and glaciers in North America. During early May, most land and freshwater areas are under a mantle of lingering snow and ice.

On the periphery of the northern Gulf of Alaska, two areas offer the majority of suitable resting, feeding, and staging habitats in the form of shallow estuaries, fertile tide flats and marshes. The Copper River Delta and contiguous areas on Orca Inlet and Controller Bay contain over 1000 square kilometers of habitats intensively used by shorebirds. Three hundred kilometers to the west, Lower Cook Inlet offers hundreds of square kilometers of habitats in Kachemak and Kamishak bays.

This restriction of habitats to a few locations accounts for spectacular concen-

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trations of shorebirds during a brief period in the spring. Spring migrant shorebird concentrations are further enhanced by the fact that the duration of the shorebird migration is telescoped at this northern latitude. The main passage of migrants occurs during a two-week period and the entire migration period is less than five weeks.

For the past fourteen years, I have been active afield in the Copper River Delta-Prince William Sound area during the period of shorebird passage and specifically engaged in migration monitoring activities during the past six years. In the course of these years, I have observed and in some cases tried to census spectacular aggregations of shorebirds. I have identified 36 species of North American shorebirds and recorded 23 as regular and occurring in noticeable volumes.

On the Copper River Delta, the arrival of the "snipes," as they are referred to by the area's clam diggers and fishermen, are synonymous with spring. This is so much so that should a warm, balmy day occur during the third week in April, just prior to the arrival of shorebirds, clam diggers and fishermen are concerned to the point of calling me on the radio and asking, "What's happened to all them snipes?" At times I have had a hard time convincing some of the interested fishermen that the birds were not all wiped out by an oil spill somewhere in the south.

On or about 25 April, the first migrant shorebirds arrive on the Copper River Delta. With the first rush of arriving shorebirds, during the last week in April, almost all regularly occurring species have been recorded. During the 14-year period, 1963 through 1976, four years stand out as being unusual—1964, 1967, 1971, and 1973. During these years phenomenal masses totaling a million or even millions of shorebirds congregated on parts of the western Copper River Delta and in contiguous Orca Inlet. The sum of 250,000 to 500,000 shorebirds at one time utilizing approximately 50 square kilometers of tidal flats in southern Orca Inlet during one day within the first ten days of May is considered a normal and expected volume.

The second year that I was present in the area was 1964 and the year of the Alaskan earthquake which uplifted the delta landmass by two meters. On 16 May 1964 (an exceptionally late date for high numbers) I observed a large foraging mass of birds east of Copper Sands on the western Copper River Delta. After three hours of strip and block censusing, I calculated approximately 250,000 shorebirds (mainly Western Sandpipers, *Calidris mauri*) in a 2.5 square kilometer area of tidal flats. This location was part of a 40 square kilometer area of tidal flats and the entire area contained large numbers of shorebirds. At that time I estimated the total area may have contained 1½ to 2 million birds.

In early May 1967, in the Mummy Island area of southern Orca Inlet, I observed another concentration of shorebirds similar to the 1964 phenomenon. While I made no attempt to census, I roughly estimated the area contained several 100,000's and guessed after viewing nearby tidal flats that the entire southern Orca Inlet hosted well over a million shorebirds.

While conducting aerial waterbird surveys of Prince William Sound in May 1971 another exceptionally large volume of Western Sandpipers and Dunlins (*Calidris alpina*) was observed on the tide flats of Orca Inlet, near the city of Cordova. At that time, the personnel of the Special Studies Office, U.S. Fish and Wildlife Service, and myself participating in the Prince William Sound aerial

surveys, could not come up with a practical, unambiguous and accurate method of censusing these shorebird volumes from aircraft. We tried at low tide, but were spooked by the wheeling masses of birds at too close quarters to the aircraft. At the next high tide a large percentage of these birds had departed the area. The 1971 aerial waterbird surveys of Prince William Sound also placed me in a position to observe a variety of shoreline and open-water habitats during the peak of spring shorebird migrations. During these surveys, I observed on one occasion a single raft of at least 50,000 Northern Phalaropes (*Lobipes lobatus*) in Hinchinbrook Entrance, Prince William Sound (right in the middle of what is now the oil tanker route, into and out of the Valdez terminus of the Trans Alaska Oil Pipeline). We also noted 10,000's of staging Surfbirds (*Aphriza virgata*) and estimated the Ruddy Turnstone (*Arenaria interpres*) population exceeded 100,000 on island beaches in the sound. The shores of Montague Island, were host to large numbers of American Golden and Black-bellied plovers (*Pluvialis dominica* and *P. squatarola*), probably 20,000 to 25,000 combined. Since we also observed Bristle-thighed Curlew (*Numenius tahitiensis*) during these surveys, we considered it probable that at least some of the plovers and turnstones may have been arriving in the area via long distance overflights of the North Pacific from islands in the central Pacific.

In 1973, extra large masses of shorebirds occurred in Orca Inlet. In that year, I made daily counts of shorebirds utilizing 15 square kilometers of tidal beaches and flats between Hartney Bay and the boat harbor in the city of Cordova. Daily strip and block censuses were made shortly after half tide on the flood from 28 April through 31 May. The numbers of shorebirds utilizing the censused tide flats exceeded 2 million between 6 May and 10 May. During the 34 days of observed passage, frequent changes in species composition gave the impression of a rapid migrational turnover. Based on an estimate of total migrational turnover of birds every three tidal ranges, the censused area was host to at least 11 million "peeps" between 28 April and 31 May. Of this total, the bulk of the passage included Western Sandpipers (6½ million) and Dunlins (3½ million). Approximately one million other small shorebirds included some interesting counts—a flock of over 100,000 Least Sandpipers (*Calidris minutilla*) and flocks of up to 10,000 Sanderlings (*Calidris alba*). Additionally, in excess of one million medium and large shorebirds were censused on these tide flats. These included large numbers of Long-billed and Short-billed dowitchers (*Limnodromus scolopaceus* and *L. griseus*), Surfbirds, Red Knots (*Calidris canutus*) and turnstones (*Arenaria* sp.).

For the past three years (1974 through 1976), the U.S. Fish and Wildlife Service has conducted stationary point migration watch studies near Mummy Island in southern Orca Inlet. This location is within a natural topographic funnel that is extensively used by coastal migrant birds. During the peak of migration, tens of thousands of birds pass hourly in view of the migration watch location. The migration watch study consists, in part, of 15-minute indexes from each daylight hour (04:00 through 22:00) of all migrant bird species crossing a north/south line. Items recorded are species (or most definitive grouping category), number, direction of flight, elevation, point of crossing, and time. Also recorded are the weather conditions, stage of tide, and visibility. Now of considerable volume, hourly indices of data are presently being prepared for statistical treatment by

Michael Jacobson, U.S. Fish and Wildlife Service, Special Studies Office, Anchorage, Alaska. This study is programmed to be continued in 1977.

Some 5 km south of the migration watch location, along the beaches of the outer coast, a light but steady westward movement of shorebirds (mainly Western Sandpipers) occurs throughout the daylight hours in May. The migration watch location near Mummy Island is at the Copper River Delta-Orca Inlet interface and receives a steady exchange of migrating and staging birds going both east and west. The movements to the east represent staging birds forced by tidal action to high tide resting and loitering areas on Egg Island on the Copper River Delta and shorebirds that overflow the area during the night and are returning to foraging areas on the delta. The majority of the shorebirds appear to migrate long distances at night. On numerous occasions we have observed shorebirds departing the Copper River Delta and Orca Inlet almost en masse. At these times, usually at sunset or late in the evening twilight, scores of flocks numbering up to several hundred birds each will lift off the tidal flats and climb to high elevations (observed up to 1000 m) and head west.

An interesting bit of data we have gathered is the current volume of Red Knots utilizing the Copper River Delta as a staging area each spring. During the mid-1960's, I estimated the area was the principal staging zone for about 10,000 Red Knots. During the late 1960's and early 1970's that number was upgraded to approximately 40,000 to 50,000. In the last two years, this number has been refigured from new data and we now estimate the area hosts a staging population of about 100,000. Single flocks of 7000 to 10,000 have been recorded regularly in the past three years and one flock was estimated at 40,000, more Red Knots than I had earlier thought were in the Pacific Coast migration corridor.

The absolute number of migrant shorebirds utilizing the coastal habitats along the northern rim of the Gulf of Alaska is unknown. However, based upon my 14 years in the Copper River Delta-Orca Inlet area and an additional 3 years in the Cook Inlet area, I have roughly estimated that the entire coastal region is host to something in the range of 20 million shorebirds each spring.

The Copper River Delta-Prince William Sound region is annually host to a large percentage of these birds. During May 1976, Alaska Department of Fish and Game personnel reported a mass of 1 to 2 million shorebirds (some 80% Western Sandpipers) located on the tidal flats at the head of Kachemak Bay in lower Cook Inlet (Paul Arneson, ADF&G pers. comm.).

Fall shorebird migrations in south-coastal Alaska are diffused over the period from the third week in June through October and dispersed over additional habitats that are not available (due to ice and snow coverings) during the spring. Extensive, but not intensive, habitat utilization by southbound migrant shorebirds occurs in south-coastal Alaska. Aggregations of shorebirds exceeding ten's of thousands have not been recorded. Available data suggest that a large percentage of southbound migrant shorebirds stage nearer their breeding grounds in northern or western Alaska and overfly or bypass the northern coasts of the Gulf of Alaska.

In conclusion, the general awareness of the magnitude of shorebird populations utilizing a few locations in south-coastal Alaska is new. Some of these data were first mentioned in print only a few years ago (Isleib and Kessel, Univ. Alaska Biol. Paper 14:1-149, 1973). These data were responsible for continued interest and studies in shorebird migration phenomena in the south-coastal Alaska region;

and they are the primary basis for the State of Alaska administration's proposal of a bill to the state legislature to create the "Copper River Delta Critical Habitat Area." The principal criterion for this 1000-plus square kilometer zone of special designation is the intensive utilization by migrant waterbirds, especially shorebirds. This designation will prioritize these wildlife habitats for waterbirds above alternate uses.