ECOLOGY AND PRESENT STATUS OF BIRDS AND MAMMALS IN INTERIOR AND ARCTIC ALASKA: REPORT FOR 1972

ECOLOGY AND PRESENT STATUS OF BIRDS AND MAMMALS IN INTERIOR AND ARCTIC ALASKA

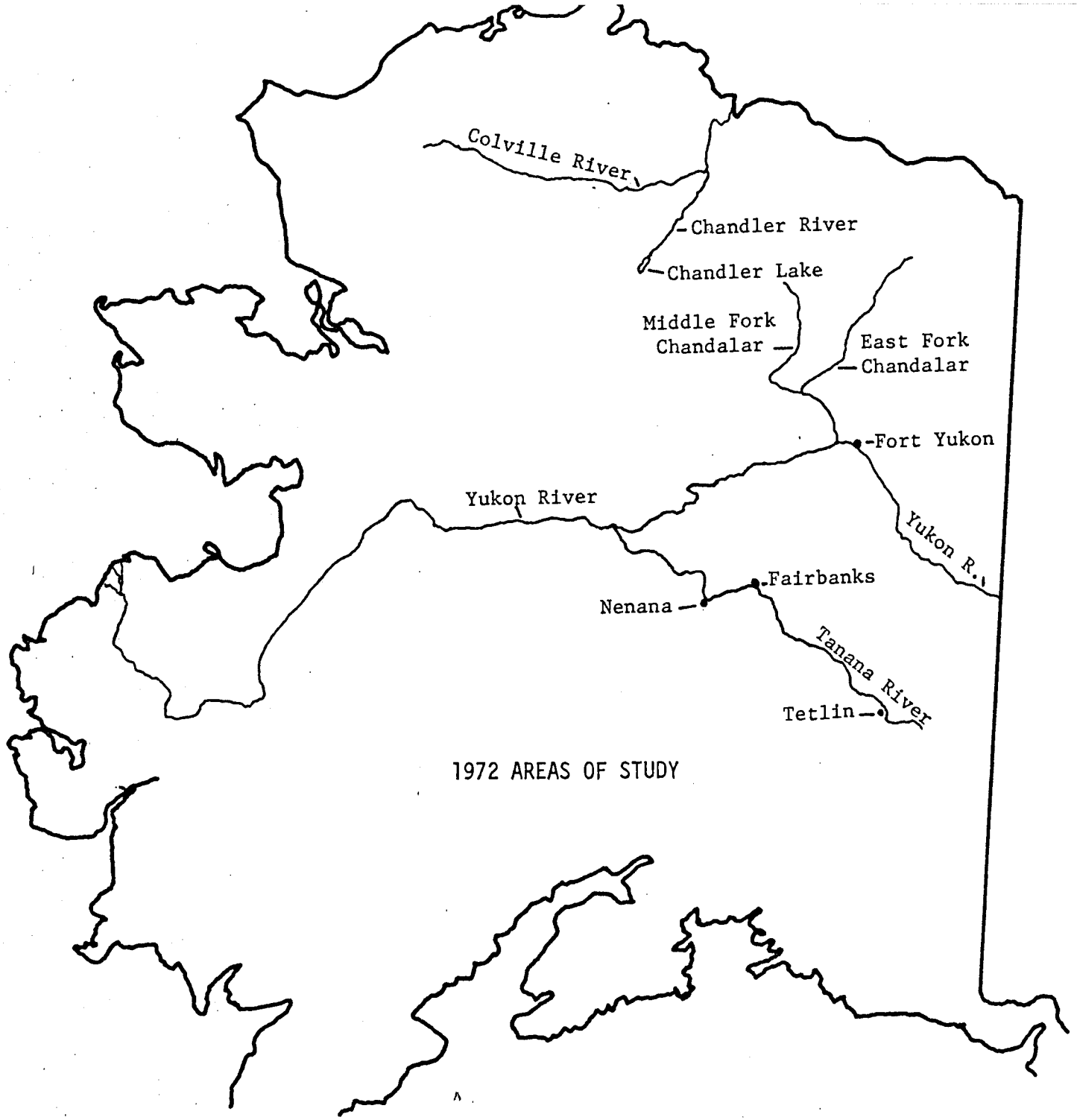
REPORT FOR 1972

submitted to

ALASKA DEPARTMENT OF FISH AND GAME

by

JOHN R. HAUGH



1972 AREAS OF STUDY

REPORT FOR 1972

PROJECT: Ecology and present status of cliff-nesting raptors and other birds in Arctic Alaska

INVESTIGATOR: Dr. John R. Haugh, Department of Biological Sciences, State University of New York, Binghamton, New York 13901

ASSISTANT: Mr. David L. Pastrich, Department of Biological Sciences, State University of New York, Binghamton, New York 13901

INTRODUCTION AND OBJECTIVES:

The tundra and taiga biomes of Alaska and Northern Canada are among the least disturbed of North America's natural communities. Until recently, severe climatic conditions and lack of accessibility have served to isolate and maintain the wilderness characteristics of the region. However, increasing cognizance of the energy crisis confronting the United States is now leading to increased pressures for exploration and exploitation of much of the northern part of our continent. In Alaska, the recent discovery of oil at Prudhoe Bay and the subsequent controversy over the construction of a pipeline from the Arctic Coast to the Gulf of Alaska have served to emphasize the developing conflicts of interests between conservationists, who would preserve as much of Alaska as possible in a relatively undisturbed state, and industrialists and developers who would exploit the natural resources of the area at the earliest opportunity.

During the past year congress has passed legislation to settle the land claims of Alaska's native peoples. A direct result of this legislation will be to "unfreeze" land in Alaska and allow for its redistribution and reclassification. As a result of the recent congressional legislation, and a subsequent amendment to this bill requiring 80 million acres to be set aside for wilderness tracts, national parks and other areas of ecological interest, much of Alaska is now being closely examined and important land classification decisions are bing made. The natural history of much of Alaska is still little known, and the more information which can be obtained, the more intelligent the decisions can be for the wise reclassification of this land. Of utmost consideration, biologically, is the status of certain rare and endangered species showing restricted distributions or narrow tolerance limits. Also of importance are areas which exhibit unique ecological features. In both of these cases special consideration should be given to land classification in order that unique areas and uncommon species can be managed by appropriate state and federal agencies and their disturbance and destruction be prevented.

In 1972 we conducted studies in three Alaskan river valleys to determine the present status and distribution of cliff-nesting raptorial birds. Special attention was given to the peregrine falcon (Falco peregrinus), a species that has recently exhibited marked declines throughout much of its former range, including several areas in Interior and Arctic Alaska (see Cade and Fyfe, 1970). We also examined, in some detail, isolated balsam poplar woodlands (Populus tacamahaca) occurring in the Chandler River Valley on the Arctic Slope, well north of the line

normally considered as the northern limit of trees. Here we attempted to determine the importance of these woodlands, if any, to arctic birds and mammals. Since trees do not normally occur on the Arctic Slope, we were interested in learning if any unusual ecological relationships existed in these unique forested areas.

Support for our study was provided by the State University of New York Research Foundation and the State of Alaska Department of Fish and Game. Richard Bishop, Regional Research Coordinator for the Alaska Department of Fish and Game, and Jerry McGowan, Alaska Department of Fish and Game Biologist, were of considerable help to the success of our efforts, and to these individuals we are especially indebted.

PRELIMINARY PREPARATIONS:

Haugh and Pastrich arrived in Fairbanks, Alaska on 31 May. On 1 June a conference was held with Richard Bishop and Jerry McGowan to discuss the summer's activities and to arrange logistic support in the form of aircraft and boats. Plans were made for 3 projects: (1) A study of birds and mammals utilizing balsam poplar woodlands in the Ninngolik Valley, near the confluence of the Siksikpuk and Chandler rivers, and a subsequent survey of cliff-nesting raptors in the Chandler River Valley, (2) An investigation of the Chandalar River drainage to evaluate its potential for cliff-nesting raptors and to determine the status of the peregrine falcon in this region, and (3) A continuation of observations on the status and pattern of decline of the peregrine falcon population along the Tanana River in Interior Alaska.

INVESTIGATIONS ALONG THE CHANDLER RIVER

METHODS AND FIELD ITINARIES:

1. Dates and places of work. --Field work for these investigations was conducted by John R. Haugh with help from David L. Pastrich. On 13 June Haugh and Pastrich were flown, by charter aircraft provided by the Alaska Department of Fish and Game, to a point in the Ninngolik Valley, one mile downstream from the confluence of the Siksikpuk and Chandler rivers. A camp was established near the landing site adjacent to a stand of poplar trees. We remained at this locality until 21 June, making observations on the flora and fauna associated with the near-by "islands" of trees. In order to examine other stands of trees, we moved downriver on 21 June to a point approximately 3 miles below the confluence of the Siksikpuk and Chandler. We remained at this second site until 25 June when we moved one mile further downriver and established a third study area. On 27 June we concluded our observations in the poplar woodlands and began a trip down the Chandler River, examining the status of raptorial birds as we traveled. On 1 July we reached the mouth of the Chandler and continued downstream on the Colville River to a point one-half mile below the confluence, where we waited to be picked up and returned to Fairbanks.

2. Bird population studies. --Attempts were made to determine what species of birds were occupying the poplar woodlands and adjacent areas of willow surrounding the stands of trees. We attempted to do this in two ways: (1) By direct observation, and (2) By netting birds with mist nets over set periods of time. For our observational surveys, we marked off study areas within the poplar woodlands and in

surrounding willow habitat. These areas were periodically visited, and all birds seen or heard calling within the confines of the study area were recorded until we were satisfied that all individuals present had been accounted for. In order to confirm our visual observations and ascertain whether some birds were passing through the study area at times when we were not present, 36mm mist nets were set up in the woodlands and periodically checked. By setting up the same number of nets for the same duration of time in different woodlands and habitats, we proposed to compare differences in species and numbers within the areas sampled.

3. Mammal population studies. --We used three techniques in attempting to learn the species of mammals which lived within the poplar woodlands or which passed through the trees during the course of their daily or seasonal activities. (1) For small mammals, snap traps were set in the same study areas where the observations and netting of birds were carried out. At the first site (one mile downriver from the confluence of the Chandler and Siksikpuk rivers) 100 traps were set in each of 5 study areas (3 in poplar woodlands and 2 in adjacent willow habitat) and were checked every 12 hours over a 48 hour period. Traps were also set in a poplar woodland study area 3 miles downriver from the confluence of the Siksikpuk and Chandler, but here, because of limited time, the traps were removed after 24 hours. Traps were set in groups of three, each group being approximately 20 feet from the nearest other group. (2) A second technique involved a careful examination for mammal sign such as fecal droppings, tracks, trails and evidence of brousing on willows scattered within the woodlands or in areas immediately surrounding them. (3) Finally, we made direct observations of several species, especially larger mammals such as moose and wolves.

4. Vegetation studies. --Although our primary goal was to examine the vertebrate fauna of the Ninngolik Valley, an attempt was made to obtain information on the botanical characteristics of the region, especially within the confines of the poplar woodland. We directed our efforts toward two major objectives: (1) Determination of the extent of the individual stands of poplar trees, the size of the trees within each stand and the age and growth rates of the trees, and (2) Determination of the other species of plants growing under and within the poplar woodlands and the relative importance of these. To fulfill our first objective, the circumference of large numbers of trees was measured in each woodland. (From these measurements dbh and area of trunk coverage can later be determined.) By examining and measuring fallen trees and selectively cutting and sampling other individuals, we hope it will prove possible to determine the relationship of trunk diameter to height and age. Analysis of these data will be completed at SUNY Binghamton at a later date. To determine the relative importance of plants in the ground stratum beneath the trees, we at first attempted to establish sample plots and to count individual plants within these plots. Because of time limitations, and because we believed this was not entirely satisfactory, we abandoned this method and visually estimated the per cent of the ground covered by the various herbaceous plants. Since most of the woodlands were small and open enough for the entire forest floor to be seen from a central location, and since the herbaceous vegetation consisted of only a few species, we believe our estimates of the per cent coverage and relative importance of herbaceous species to be reasonably accurate.

5. Examination of cliffs and raptor nests. --At the conclusion of our observations in the poplar woodlands, we floated down the Chandler River in a raft and examined cliffs along the river to determine their suitability for cliff-nesting

raptors and to observe their present state of occupancy by these birds. Since Haugh and Conner had made aerial observations along the same stretch of river in 1971 (see 1971 report), we were also interested in obtaining data in order to evaluate the accuracy of the aerial survey method. Most cliffs along the Chandler River are small and could be checked adequately from below. In order to ascertain that no raptors were present which might be overlooked, rifle shots were fired to flush off birds that might be present. When cliffs were too large to be examined adequately from below, or when active nesting sites were suspected, we climbed and walked the tops of the bluffs to locate nests and to more closely examine the cliffs. To reach actual nesting sites, a 120 ft. climbing rope and conventional climbing techniques were used.

6. Miscellaneous observations. --During the course of our work along the Chandler River, careful records were kept on all wildlife observed. We collected data mainly on birds and large mammals.

RESULTS AND DISCUSSION:

1. General conditions; weather and phenology. --Spring was late in coming to the Arctic Slope in 1972. Upon our arrival at the confluence of the Chandler and Siksikpuk rivers on 13 June the tundra showed no signs of green, and snow banks were still common in gully areas, especially those on north-facing slopes. Along the river the poplars were showing the first signs of green and the lupines were budding, but the willows were still dormant. The temperature was in the mid 70's on the afternoon of 13 June and the Chandler River, although still high from the melting snow, was receding. Mosquitoes were not yet out and little bird activity was evident.

The weather continued sunny and warm through the 17th with daily high temperatures in the upper 70's to low 80's and daily lows in the 50's. By the 17th a few mosquitoes were beginning to emerge, lupines were in bloom, poplars were fully leaved out, and the tundra was beginning to turn green on south-facing slopes. On the 18th a period of cool and cloudy weather settled over the valley and continued through the 27th. During this time there were frequent periods of rain and wind, temperatures were mostly in the 40's and 50's and conditions were generally unpleasant. Between the 17th and 27th bird activity increased somewhat but never reached expected levels. Willows were fully leaved by the 24th.

From 28 June through 3 July the weather was mainly clear and temperatures gradually became warmer, reaching the upper 80's by 1 July. With the improving weather mosquitoes became abundant and reached an unusually high density by early July.

2. Geographic and geomorphological characteristics of the Chandler Valley. --Although originating in the Brooks Range, the Chandler River passes mostly through the northern foothill country. From its source at Chandler Lake it flows a little over 100 miles before emptying into the Colville. Except within a few miles of its source and again near its outfall, it cuts numerous cliffs ranging in size from a few feet to over 300 feet in height. Most of these are quite short, rarely exceeding a quarter mile in length. The Chandler River cliffs consist mainly of outcroppings of the Nanushuk and Colville Groups, which are intertongued deposits of marine and non-marine sediments of late Mesozoic age, consisting of sandstone and

clay shale, with local deposits of coal, bentonite and tuff. Fracturing of rock caused by freezing and thawing, along with the erosive effects of melting snow and rain, combine to make the cliffs unstable, and in some years lack of stability apparently causes considerable mortality among young raptors.

3. The balsam poplar woodlands. --Analysis of the botanical data collected in the poplar woodlands is, at present, incomplete, but a few preliminary remarks are perhaps in order.

Balsam poplar (Populus tacamahaca) occurs widely throughout much of Alaska. On the Arctic Slope, an area generally considered north of the tree line, only a few areas have been colonized by this species, and the Chandler River Valley contains some of the largest stands. Here trees are concentrated in the Ninngolik Valley, an area about 5 miles in length just below the confluence of the Chandler and Siksikpuk rivers. Some trees, however, extend up the Siksikpuk for approximately one mile, and occasional patches of trees, sometimes consisting of less then 10 individuals, occur downriver on the Chandler to within 5 miles of the river's outfall. Evidence indicates that the majority of these stands are of fairly recent origin, for except where the river is actively eroding wooded areas, there is a noticeable lack of fallen or partially decayed trees. A few stands do, however, seem to be somewhat older. Trees examined in a stand 3 miles below the Siksikpuk-Chandler confluence appeared noticeably larger and older than trees in other stands. Most trees in the Ninngolik Valley were under 15cm dbh, but a few in the mature stand 3 miles below the confluence had diameters as great as 25cm (dbh). Only rarely did patches of trees exceed one acre in size. Exceptions to this were found near the confluence where stands of trees were not always clearly defined and tended to run together.

Beneath the poplar trees, the extent of coverage by plants of the lower stratum varied considerably in different patches of trees. In some stands 80% or more of the ground was bare (except for leaves and other plant debris from the poplars and surrounding vegetation), but in others up to 75% of the ground was covered by living plants. Among the common understory plants were prickly rose (Rosa acicularis), wintergreen (Pyrola grandiflora), arctic lupine (Lupinus arcticus), alder (Alnus crispa), horsetails (Equisetum spp.) and willows (Salix spp.). Prickly rose tended to be more common in older stands of trees, while lupine and willows were more abundant in younger stands.

4. Birds of the poplar woodlands. --We studied 5 stands of poplar trees in considerable detail. In these areas we set mist nets and made a minimum of 2 visits to each area each day. During the 48 hour period when the nets were in operation, our visits were more frequent. For further details of the results of our netting and observations see Table I. Although spending less time in other stands of trees, we examined and attempted to locate birds in about 80% of the poplars downriver from the Siksikpuk-Chandler confluence.

We found no birds nesting in any of the poplars in 1972, and no birds were nesting in the vegetation within the limits defined by any stand of trees. We did, however, find one abandoned nest in a group of 6 isolated poplars which appeared to have been a nest constructed by ravens. The nest contained one adult raven feather beneath some debris, but there was no evidence that the birds had ever attempted to raise young there. Although ravens occasionally build and occupy tree nests in

Interior Alaska, more typical nests are on the ledges of cliffs, and all active nests I have seen on the Arctic Slope have been in typical cliff situations. On several occasions we found passerine nests within 100 feet of the poplar stands, but these were always in willows and not in the trees.

Although no birds were actually nesting in the poplars, some species nesting near-by in the willows occasionally visited the trees. Robins (Turdus migratorius) and gray-cheeked thrushes (Hylocichla ustulata) used the trees as singing perches, and red polls (Acanthus flammea) flew through the woodlands during the course of their daily activities.

During the two weeks we were in the Ninngolik Valley, we were most impressed by the lack of small passerine birds nesting in other riparian habitats along the river. Kessel and Cade (1958) recorded 11 passerines in the riparian tall-brush zone, but we only found 7 of these occurring in the same kind of vegetation in the Ninngolik Valley (see Table II). The only small bird we found which Kessel and Cade did not find on the Colville was a Trail's flycatcher (Empidonax traillii). We believe this bird may have been nesting in the willows adjacent to some poplars, but we were unable to locate the nest. Of the 7 passerine species we recorded, only 4 species were common. These were the robin, gray-cheeked thrush, arctic warbler (Phylloscopus borealis) and redpoll.

Of particular interest was the paucity of sparrows in the area. During the time we were in the Ninngolik Valley, we recorded only 3 fox sparrows (Passerella iliaca), 2 of which were probably a nesting pair. We recorded the white-crowned sparrow (Zonotrichia leucophrys) and tree sparrow (Spizella arborea) on only a single occasion. Kessel and Cade found white-crowned sparrows and fox sparrows to be birds of major importance in riparian areas along the Colville River and considered the tree sparrows to be of secondary importance.

Of the 11 riparian passerine species recorded by Kessel and Cade, 7 were recorded by Campbell (1968) in the area of Chandler Lake at the headwaters of the Chandler River (Table II). Of these, he considered only the tree sparrow to be common (although he observed red polls on several occasions). Weather conditions are considerably more severe near Chandler Lake than in the Ninngolik Valley, and the riparian vegetation is much reduced (in many areas lacking entirely) around Chandler Lake.

From the discussion above it appears that several passerine species common along the Colville drop out as important parts of the avifauna in the middle and upper regions of the Chandler Valley. The reason for this is not entirely clear. Although the absence of nesting passerines in the Ninngolik Valley in 1972 may have been to some extent the result of the late arrival of spring, this seems unlikely since robins, gray-cheeked thrushes, red polls and arctic warblers were common and appeared to be nesting successfully in the area. Two other possibilities exist which may account for the lack of some species in the Ninngolik Valley. In 1972 we noticed that the Brooks Range influences weather much more strongly in the middle and upper Chandler Valley than along the Colville River. On several days when cool, cloudy weather and showers prevailed over our study area, we could plainly see that 20 or 30 miles further north (toward the Colville) skies were clear and sunny. Likewise, while working along the Colville in past summers I have often noted that although clear weather prevailed locally, cloudy conditions existed over the mountains and adjacent areas to the south. Thus, greater numbers of days with adverse weather closer to the Brooks Range may be an important limiting

factor to some species. The fox sparrow may be a bird whose distribution is limited in this way.

A second possibility perhaps accounting for the lack of passerines in the Ninngolik Valley may relate to the influence of topography on the migration routes and subsequent settling of some species. Campbell has noted that although Anaktuvuk Pass and Chandler Lake are both at the same latitude and share common physiographic and biological characteristics, Chandler Lake, which has an elevation of 2,900 feet is more than 700 feet higher than the valley floor at the summit of Anaktuvuk Pass. Campbell also notes that:

> "This altitudinal difference together with other terrain differences causes the land environment of the Chandler Lake Valley to be appreciably more severe than that of Anaktuvuk and its aerial approaches to be more restricted. This is apparent in the number of birds known to occur in the two places. The total published and unpublished summer and migrant list for Anaktuvuk Pass, north of the forest, contains twice as many species as the list for Chandler Lake."

Therefore, some species, such as the white-crowned sparrow, which regularly migrates through Anaktuvuk Pass and along the Anaktuvuk River (see Irving, 1960), may not move down the Chandler River on its way north. Upon reaching the Colville River, where the riparian community is well developed, it seems unlikely that many individuals would reverse their direction to fly south and nest in an area which is probably less favorable because of the poorer weather nearer to the mountains.

With the exception of cliff-nesting species, the birds present in the Ninngolik Valley are those which nest in willow brush, on gravel bars, on open tundra or in other situations near the ground. No tree nesting species occurs there, and no local population or individuals appear to take advantage of the developing poplar forests in the region. This is not surprising considering that the trees are apparently of recent origin and remain quite restricted in their distribution at the present time.

5. Large mammals of the poplar woodlands. --In 1971 Haugh and Conner counted 47 moose (Alces americana) in the Ninngolik Valley on 16 June when they flew over the area. On the same date 4 grizzly bears (Ursus horribilis) were also seen in the valley. This high density of moose and bears was impressive and raised the possibility that the Ninngolik Valley might be an area of major concentration for large mammals, at least during the early part of the summer.

In 1972 moose sign was very common in the valley. It was impossible to walk more than 100 feet on almost any mud or sand substrate without seeing moose droppings or tracks, and moose trails through the willows and poplars were abundant. It was obvious that large numbers of moose had recently been using the area, but it was also obvious that most of these had moved out from the area of the Siksikpuk-Chandler confluence by mid June. During our work in the Chandler Valley we sighted 12 moose; 8 of these were in the Ninngolik region and the remaining 4 were further downriver. (See Tables III and VIII for more details.)

We saw no grizzly bears along the Chandler River, and I observed less fresh bear sign in 1972 than in any of the other 4 years in which I have spent time on the Arctic Slope. In the Ninngolik Valley we found many fecal droppings, but these

all appeared to be from the previous year. Fresh bear tracks were seen at three locations: (1) On 27 June 8 miles below the confluence of the Siksikpuk and Chandler rivers, (2) on 28 June opposite Tuluvak Bluff, and (3) on 29 June approximately 7 miles upriver from the abandoned Gubic gas well.

Wolf (Canis lupus) sign was nearly as common as moose sign along the Chandler River in 1972. This was especially true in the Ninngolik Valley. In the past I have found the wolf to be a shy and elusive animal, and during 4 previous summers in Arctic Alaska I had seen only 4 wolves, even though at times wolf sign was very common. It was somewhat surprising, therefore, to have 5 wolf sightings involving a minimum of 3 wolves in the Ninngolik Valley. Of these, 4 sightings were within one mile of the confluence of the Siksikpuk and Chandler rivers, and one was 3 miles below the confluence. On the lower part of the Chandler River wolf sign continued to be common, and, on the average, we observed wolf sign at 2 out of ever 3 locations where we stopped along the river (see Tables III and VIII).

Other large mammals were less common along the Chandler River in 1972. The only caribou (Rangifer arcticus) sighting involved approximately 30 animals seen from the plane on 13 June near the Siksikpuk-Chandler confluence as we flew into the Ninngolik Valley. We observed one wolverine (Gulo luscus) as it ran into the willows along the river on 29 June near the downriver end of Tuluvak Bluff. We We saw no foxes (Vulpes fulva) or fox sign along the Chandler River, but on 30 June one individual, red in color, briefly visited our camp site on the Colville River a quarter mile below the mouth of the Chandler.

In general, our observations indicate that several species of large mammals pass through the stands of poplar, but except perhaps for temporary shelter, it appears that none of these is directly influenced by the presence of the trees. The moose is by far the most common of the large mammals passing through the trees, but it does not browse on the trees as far as could be determined. Likewise, wolves, bears and other large mammals pass through the trees in the course of their normal activities but appear not to be influenced by them in any way. Although caribou migrate along the Chandler River, they appear to avoid the trees, for although their trails were evident along the edge of the tundra and occasionally in the smaller willows, they did not enter the woodlands.

6. Small mammals of the poplar woodlands. Table IV summarizes the results of our trapping for small mammals in 3 study areas in the poplar woodlands and 2 areas in adjacent willow habitats. By far the most common rodent in the Ninngolik Valley was the Alaska vole (Microtus miuris). At the study areas one mile below the confluence of the Siksikpuk and Chandler rivers this was the only microtine found. The species seemed to be equally distributed in willow and poplar areas, and the total numbers trapped were nearly equal in each of the two habitats. Of particular interest, however, was the apparent lack of this species 2 miles further downriver. We trapped for one night at this latter locality and failed to catch any Alaska voles. Two brown lemmings (Lemmus trimucronatus) were caught, however, in a set of 3 traps placed along the edge of the trees near the bank of the river. Other than microtine rodents, the only other small mammal observed in the Ninngolik Valley was the arctic ground squirrel (Citellus parryi). This species was observed on several occasions near the edge of poplar stands, most frequently where the river was actively eroding the banks. It did not, however, appear to enter into the wooded areas. Additional trapping is required before conclusive evidence is obtained on whether small mammals are in any way influenced by the trees. It appears, however,

that the microtine species associated with the riparian willow community pass freely back and forth into the poplars, and that the stands of trees are not extensive enough to influence the distribution of these animals.

7. Raptor populations along the Chandler River. --In 1972 we located 2 pairs of peregrine falcons, 3 pairs of gyrfalcons (Falco rusticolus) and 10 pairs of rough-legged hawks (Buteo lagopus) on the Chandler River between the Siksikpuk-Chandler confluence and the outfall at the Colville. Except for 2 pairs of rough-legs, all raptors located had viable young or eggs at the time of our observations in late June. (Table V provides additional reproductive data on the raptors observed along the Chandler River in 1972.) The 1972 figures compare with one pair of peregrines, 4 pairs of gyrfalcons and 3 pairs of rough-legged hawks located in 1971 during the aerial survey along the same stretch of river. The 1971 and 1972 figures for rough-legged hawks are not strictly comparable, however, since a shortage of time and fuel prevented us from searching adequately for rough-leg nests in 1971. Nevertheless, from what we did observe from the air in 1971, it seems likely that more rough-legged hawks were nesting successfully in 1972, and that part of the discrepancy in numbers reflects this. The one fewer pair of gyrfalcons and the one additional pair of peregrines located in 1972 are probably not significant as the number of successful pairs located in any one year would be expected to show some variation reflecting early nesting failures due to predation, mud slides, or other accidents. Moreover, the number of nesting pairs of gyrfalcons and rough-legged hawks attempting to nest is known to vary somewhat from year to year in relation to fluctuations in prey species (see White and Cade, 1971), adding further to the uncertainty of predicting population levels of raptors from a single survey. In any event, it seems likely that 2 pairs of peregrines, 4 pairs of gyrfalcons and 10-12 pairs of rough-legged hawks is a reasonably accurate prediction of the numbers of pairs of these species annually attempting to breed along the part of the Chandler River under study.

INVESTIGATIONS ALONG THE CHANDALAR RIVER

METHODS AND FIELD ITINARIES:

1. Dates and places of work. --Field work for this investigation was conducted by John R. Haugh with help from David L. Pastrich. On 8 July Haugh and Pastrich were flown to the Chandalar River drainage by charter aircraft provided by the Alaska Department of Fish and Game. An aerial reconnaissance of the Middle and East Forks of the Chandalar revealed a lack of appropriate cliffs along the Middle Fork; only the East Fork showed promise for nesting raptorial birds. It was, therefore, decided to devote all available time to the study along the East Fork.

A gravel bar large enough for a landing was located near Little Rock Mountain on the East Fork about 50 miles upriver from the river's confluence with the Middle Fork. Upriver from Little Rock Mountain the East Fork does not cut cliffs and this upper stretch of river was judged unsuitable for cliff-nesting raptors. Two boats had been provided for our use, an 8 ft. inflatable raft and a 16 ft. folding vinyl boat. After assembling our craft, we began moving downriver late in the afternoon on 8 July. We continued on subsequent days, examining cliffs for nesting raptors as we traveled. Late in the day on 12 July we reached the confluence of the East

and Middle forks. The 13th of July was spent checking a series of large cliffs on the main Chandalar below the confluence. On the 14th we continued down the river to a gravel bar 4 miles below the confluence where we waited to be picked up by the plane on 17 July.

2. Examination of cliffs and raptor nests. -We used the same methods in locating raptor nests along the Chandalar River as we had previously used along the Chandler. For further information see the description in the first section of this report.

3. Miscellaneous objectives. --During the course of our study along the Chandalar River, careful records were kept on all wildlife and wildlife sign which we observed. Time limitations prevented a more intensive investigation of the avifauna of the area.

RESULTS AND DISCUSSION:

1. General conditions; weather and phenology. --At the time of our study along the Chandalar mid-summer weather prevailed. Conditions were warm and sunny from 8 to 13 July with afternoon temperatures in the low 80's and early morning temperatures in the 50's. Little rain had fallen recently along the river, and the forests were quite dry. Most small birds were out of the nest, wildflowers were past their blooming peak and mosquitoes were generally absent, except for a few individuals during the cool hours of late evening and early morning.

On the 13th some thunderstorm activity was evident to the north toward the mountains, and on the 14th storm activity continued to develop and moved south to give us a short, but violent, thunderstorm during the afternoon. Lightning from the storms apparently started fires, for the density of smoke in the air increased considerably between 14 and 16 July. From 15 to 17 July the weather was mostly cloudy and cool with low lying clouds and occasional periods of rain. The river became quite turbid on the 15th and rose nearly a foot, but then crested and dropped slightly by the 17th when our plane arrived and returned us to Fairbanks.

2. Geographic and geomorphological characteristics of the valley of the East Fork of the Chandalar. --The substrate of the East Fork of the Chandalar Valley is mostly composed of geosynclinal deposits of Paleozoic origin, and in the lower reaches these deposits have been metamorphosed. At the confluence with the Middle Fork there occurs an area of Mesozoic granitic rock. It is in the lower reaches of the valley and around the confluence that the cliff formations are best established, and it is this area that is most favorable for cliff-nesting birds. Further upstream, river bluffs are more scattered and are often of sand or clay deposits.

In general, the flora along the East Fork of the Chandalar is typical of that commonly associated with the northern boreal forest and appears not to differ significantly from that found in many other areas of the Yukon drainage. Spruce forest covers the valley and extends to the top of most of the low mountains adjacent to the river. Successional stages are occupied by deciduous species typical of those occurring elsewhere in the biome.

3. Raptor populations along the Chandalar River. --The golden eagle (Aquila chrysaetos) was the only species of cliff-nesting raptor found along the East Fork of the Chandalar. Four eagle nesting sites were located in 1972, but only 3 of these were active. The inactive nest was located just below the brink of a cliff which had recently been burned by a small forest fire, probably in 1971. Evidence at this site indicated that the nest had not been used in 1972, but it was in good repair and was probably used the previous summer, perhaps being abandoned at the time of the fire. Of the 3 active nests, one had 3 young, one had 2 young and the third had one young. Of 25 prey remains located in and around these nests, 24 were snowshoe hare (Lepus americanus) and one was an arctic ground squirrel, thus reflecting the fact that hare populations were still at reasonably high levels along the Chandalar River in 1972, while arctic ground squirrels were not common in the area.

The Chandalar River is part of the Yukon River drainage, a region known to have long established populations of peregrine falcons (see Cade, White and Haugh, 1968). Since these falcons are known to occur along the Porcupine and Yukon rivers, less than 100 miles from the East Fork of the Chandalar, and since cliff nesting sites are adequate for peregrines in the areas we studied, it is difficult to explain the absence of this species from the cliffs along the East Fork. The explanation may rest in some habitat variation. For instance, the Yukon, Porcupine and Chandalar rivers all flow through regions of spruce covered hills, but the Chandalar Valley is much better drained and lacks extensive areas of muskeg and oxbow lakes common along the Yukon and parts of the Porcupine. Therefore, a lack of suitable hunting habitat (or prey species normally associated with such habitat) may be limiting the distribution of the peregrines in this region.

Additional information on nesting golden eagles along the Chandalar River can be found in Table VI.

1972 PEREGRINE FALCON SURVEY IN THE TANANA VALLEY

METHODS AND FIELD ITINARIES:

1. Dates and places of work. --Field work for the peregrine survey in the Tanana Valley was conducted by John R. Haugh and David L. Pastrich. Jerry McGowan, Terry Bendock and Mike Vierthaler of the Alaska Department of Fish and Game, and Mr. and Mrs. J. W. Corderman of the State University of New York assisted with parts of the study.

On 6 June Haugh, Pastrich, McGowan and Bendock made a round trip, by riverboat, from Fairbanks to Nenana to check cliffs and former peregrine nesting sites along the Tanana River. The boat and large outboard motor, loaned to us by the Alaska Department of Fish and Game, enabled the completion of the survey on this section of the river in one day. Later, on 22 July, Haugh and Pastrich, accompanied by Vierthaler and Mr. and Mrs. J. W. Corderman, drove from Fairbanks to the Tetlin bridge to begin the peregrine survey on the upper section of the river between Tetlin and Fairbanks. Traveling by rubber raft and canoe, we began our travel on the river on 22 July. Because of recent rains, the river was high and moved quite rapidly, enabling us to reach Fairbanks on the evening of 31 July.

2. Examination of cliffs and raptor nests. --The methods used to locate

raptors along the Tanana were similar to those used on the Chandler River and have been described in the first section of this report.

RESULTS AND DISCUSSION:

1. General conditions; weather and phenology. -- Late spring conditions prevailed in the Tanana Valley on 6 June, and most of the vegetation along the river was fully leaved out. Mosquitoes were beginning to emerge but were still well below the level of peak abundance. The weather along the Tanana River was cool and cloudy on 6 June, and the river was low.

Late summer weather and conditions were encountered during the work on the upper river in late July. The river was high from normal late summer rains when we began our survey on 22 July. From 22 to 26 July variable cloudiness prevailed with frequent periods of light rain. In the early morning hours of 27 July a heavy rain began which continued until late afternoon, dropping nearly 3 inches of rain over the upper Tanana Valley. This produced a rapid rise in the level of the river and resulted in flood conditions on 28 and 29 July. From 28 to 30 July partly cloudy skies brought good weather, but on 31 July cloudiness developed and conditions again deteriorated with light rain by evening. Temperatures from 22 to 31 July ranged mostly in the 50's to mid 70's with brief periods in the 40's.

2. Geographic and geomorphological characteristics of cliff-nesting habitat. --Throughout most of its length the Tanana River flows through a wide U-shaped valley. Cliffs are found only where the river encounters hills, and there are extensive areas where suitable falcon nesting habitat is lacking. Cliffs are largely of metamorphic rock and are relatively stable. Nevertheless, extreme temperature fluctuations have severely fractured the rock, and much of it is loose and requires caution while climbing on it. Because of the relative stability of the cliffs, it seems likely that few falcon nests are lost to rock and mud slides along this river.

3. Peregrine falcon populations along the Tanana. --Four pairs of peregrines were found along the Tanana River between Tetlin and Big Delta in 1972. Of these, 2 pairs produced 3 young each, one pair produced 2 young and one pair failed to nest successfully (see Table VII). The 4 active sites found in 1972 were in the same locations occupied by falcons in 1971. In 1972, for the second straight year, no peregrines were found between Big Delta and Fairbanks or between Fairbanks and Nenana.

In the past as many as 13 pairs of peregrines may have nested on the Tanana River between Tetlin and Nenana. (This estimate is based upon information provided by Alaskan ornithologists, river guides and other sources.) Although records are not adequate to determine when the majority of the falcons disappeared, it seems likely that most of the decline occurred between 1960 and 1970. In 1970 Haugh and Cade surveyed the falcon population between Tetlin and Nenana and found 7 pairs of falcons. This number declined to the present level of 4 pairs in 1971. The reason for the decline of the peregrines along the Tanana is uncertain, but a combination of factors may be involved. Accumulation of pesticide residues may be having an influence on the birds (see Cade, et.al., 1968; White and Cade, 1971), but the fact that extinction has been most rapid, and now appears complete, along the more accessible parts of the river between Big Delta and Nenana indicates that direct human interference may be a factor of major importance in the decline of the peregrine

along the Tanana. In this light, it is interesting to note that in 1970 falconers illegally robbed young falcons from several nests between Fairbanks and Tanacross. Of the three pairs of birds which failed to return in 1971, two were in the area disturbed by the falconers, and one was near Fairbanks and perhaps also subject to considerable human disturbance. In a healthy population, nest robbing would usually not be expected to lead to nest site abandonment the following year. However, in a "sick" population containing high levels of pesticide residues, human disturbance might play a more important role. Moreover, in a population failing to reproduce at normal levels, surplus individuals would not be available to replace birds which had disappeared, and, therefore, once abandoned, sites would not be found and reoccupied by other falcons.

In the light of recent declines in peregrines throughout much of their former range in North America and Europe (see Hickey, 1969) and along the Tanana River, a further decline in 1972 of the Tanana falcon population seemed to be a strong possibility. Therefore, even though the failure of one of the pairs to raise young is disappointing, the continued occupancy of 4 sites in 1972 is encouraging. The isolated nature of these remaining sites serves, to an extent, to protect the birds still present and lends hope that this residual population will survive to reproduce and repopulate former eyrie sites along the Tanana River when environmental conditions improve.

LITERATURE CITED

Cade, T. J., and R. Fyfe
1970. The North American peregrine survey, 1970. Canadian Field-Naturalist, 84: 231-245.

Cade, T. J., C. M. White and J. R. Haugh
1968. Peregrines and pesticides in Alaska. Condor, 70: 170-178.

Campbell, J. M.
1968. Birds of Chandler Lake, Brooks Range, Alaska. Murrelet, 49: 15-24.

Hickey, J. J.
1969. Peregrine falcon populations, their biology and decline. Univ. of Wisconsin Press, Madison.

Irving, L.
1960. Birds of Anaktuvuk Pass, Kobuk and Old Crow. U. S. Natl. Mus. Bull., 217.

Kessel, B., and T. J. Cade
1958. Birds of the Colville River northern Alaska. Biol. Papers Univ. Alaska, No. 2.

White, C. M., and T. J. Cade
1971. Cliff-nesting raptors and ravens along the Colville River in Arctic Alaska. Living Bird, 10: 107-150.

TABLE I

BIRDS NETTED AND OBSERVED IN POPLAR WOODLANDS AND ADJACENT WILLOWS

AREA DESCRIPTION AND LOCATION	DATES OF NETTING	SPECIES CAPTURED (N) OR OBSERVED (O)	COMMENTS
Young poplar woodland with few interspersed willows 1 mi. below confluence of Siksikpuk and Chandler rivers	17-18 June	Redpoll (N) Gray-cheeked thrush (N)	
Young poplar woodland 1 mi. below confluence of Siksikpuk and Chandler rivers	18-19 June	Robin (N) Robin (N) Gray-cheeked thrush (O) Redpoll (N) Redpoll (N)	
Riparian willow brush 1 mi. below confluence of Siksikpuk and Chandler rivers	17-18 June	Robin (N) Robin (N) Redpoll (N) Robin (N) Gray-cheeked thrush (N) Gray-cheeked thrush (O)	
Riparian willow brush 1 mi. below confluence of Siksikpuk and Chandler rivers	18-20 June	Gray-cheeked thrush (N) Gray-cheeked thrush (N) Robin (N) Redpoll (N) Redpoll (N) Redpoll (N) Redpoll (N) Fox sparrow (N)	Net closed on 19 June because of high winds
Mature poplar woodland 3 mi. below confluence of Siksikpuk and Chandler rivers	22-23 June	Robin (N) Gray-cheeked thrush (N) Redpoll (N) Redpoll (N) Redpoll (N) Redpoll (N) Redpoll (N) Redpoll (N)	Net destroyed by moose on morning of 23 June
Young poplar forest with interspersed willow 3 mi. below confluence of Siksikpuk and Chandler rivers	22-23 June	Traill's flycatcher (N) Gray-cheeked thrush (N) Gray-cheeked thrush (N) Gray-cheeked thrush (N) Redpoll (N) Redpoll (N) Redpoll (N)	

(continued on next page)

(TABLE I - continued)

AREA DESCRIPTION AND LOCATION	DATES OF NETTING	SPECIES CAPTURED (N) OR OBSERVED (O)	COMMENTS
Riparian willow brush 3 mi. below confluence of Siksikpuk and Chandler rivers	22-23 June	Robin (N) Gray-cheeked thrush (N)	Net destroyed by moose on 23 June

TABLE II

BIRDS OF THE RIPARIAN BRUSH
RECORDED IN THE CHANDLER AND COLVILLE VALLEYS

SPECIES	CHANDLER LAKE*	NINNGOLIK VALLEY	LOWER CHANDLER	COLVILLE VALLEY**
Robin	X	XX	XX	XX
Gray-cheeked thrush	-	XX	XX	XX
Bluethroat	-	-	-	X
Arctic warbler	-	XX	XX	XX
Yellow wagtail	X	-	(U)	X
Northern shrike	X	-	(U)	XX
Wilson's warbler	-	-	-	X
Redpoll	X	XX	XX	XX
Tree sparrow	X	X	(U)	XX
White-crowned sparrow	X	X	(U)	XX
Fox sparrow	X	X	(U)	XX
Traill's flycatcher	-	(U)	-	-

*Data from Campbell, 1968
**Data from Kessel and Cade, 1958 and from unpublished observations by J. R. Haugh

XX = regular in occurrence
X = uncommon or rare
(U) = observed but status uncertain
- = not observed

SCIENTIFIC NAMES OF ABOVE SPECIES:

Robin	*Turdus migratorius*
Gray-cheeked thrush	*Hylocichla ustulata*
Bluethroat	*Luscinia svecica*
Arctic warbler	*Phylloscopus borealis*
Yellow wagtail	*Motacilla flava*
Northern shrike	*Lanius excubitor*
Wilson's warbler	*Wilsonia pusilla*
Redpoll	*Acanthis flammea*
Tree sparrow	*Spizella arborea*
White-crowned sparrow	*Zonotrichia leucophrys*
Fox sparrow	*Passerella iliaca*
Traill's flycatcher	*Empidonax traillii*

TABLE III

1972 WOLF AND MOOSE SIGHTINGS

OBSERVATION NO.	DATE	RIVER	LOCATION	COMMENTS
			WOLF	
1	13 June	Chandler	1 mi. below confluence of Siksikpuk & Chandler	A light gray wolf watched us unloading the plane; was seen on several other occasions during next 2 days.
2	18 June	Chandler	1 mi. below confluence of Siksikpuk & Chandler	A large blond wolf was seen watching us from the edge of the willows.
3	19 June	Chandler	1 mi. below confluence of Siksikpuk & Chandler	A small blond wolf was seen crossing a gravel bar near camp.
4	23 June	Chandler	3 mi. below confluence of Siksikpuk & Chandler	A large gray wolf was seen on the opposite bank of the river; it watched us for several minutes, finally disappearing over a hill.
5	11 July	E. Fk. of Chandalar	mouth of Crater Creek	A light colored wolf was observed following our tracks while we watched from the top of a cliff.
			MOOSE	
1	16 June	Chandler	1 mi. below confluence of Siksikpuk & Chandler	A large cow moose was seen crossing a gravel bar.
2	21 June	Chandler	3 mi. below confluence of Siksikpuk & Chandler	A cow moose was seen standing in the river as we floated by.
3,4,5	21 June	Chandler	3 mi. below confluence of Siksikpuk & Chandler	3 bulls were seen together; 2 had antler about 4 ft. across and the other had antlers just beginning to grow.
6,7	22 June	Chandler	3 mi. below confluence of Siksikpuk & Chandler	A cow with a calf stood ant watched us from across the river for nearly an hour

(continued on next page)

(TABLE III - continued)

OBSERVATION NO.	DATE	RIVER	LOCATION	COMMENTS
8	24 June	Chandler	2 1/2 mi. below confluence of Siksikpuk and Chandler	A single cow was seen.
9,10	24 June	Chandler	3 mi. below confluence of Siksikpuk and Chandler	A cow and a calf were seen. These may have been the same animals as observation numbers 6 & 7.
11	28 June	Chandler	mouth of Trouble Creek	A bull, having an antler spread of about 4 feet, was seen.
12	29 June	Chandler	below Tuluvak Bluff	A moose was seen in the distance from the top of a cliff.
13,14	30 June	Chandler	1/2 mile upriver from Gubik Gas Well	A cow with a calf was seen on the bank of the river.
15	25 July	Tanana	Round Lake area	A young bull swam across the river and nearly came into our camp.

TABLE IV

SMALL MAMMAL TRAPPING RESULTS

AREA DESCRIPTION AND LOCATION	DATES OF TRAPPING	ANIMALS CAUGHT 1st 24 hours	ANIMALS CAUGHT 2nd 24 hours
Young poplar woodland 1 mi. below confluence of Siksikpuk and Chandler rivers	15-17 June	4 Alaska voles	3 Alaska voles
Young poplar woodland with few interspersed willows 1 mi. below confluence of Siksikpuk and Chandler rivers	18-20 June	5 Alaska voles	4 Alaska voles
Riparian willow brush 1 mi. below confluence of Siksikpuk and Chandler rivers	15-17 June	5 Alaska voles	-
Riparian willow brush 1 mi. below confluence of Siksikpuk and Chandler rivers	17-19 June	7 Alaska voles	4 Alaska voles
Mature poplar woodland 3 mi. below confluence of Siksikpuk and Chandler rivers	22-23 June	2 brown lemmings	(no traps set)

TABLE V

1972 CHANDLER RIVER RAPTOR NESTS

EYRIE NUMBER	EYRIE LOCATION	DATE OF OBSERVATION	NO. OF EGGS	NO. OF YOUNG
	ROUGH-LEGGED HAWK			
1	4 mi. downriver from confluence of Siksikpuk and Chandler rivers	25 June	-	3
2	2 mi. downriver from Grandstand Ridge	27 June	-	-
3	western most end of the bluff at the big bend of the Chandler River	28 June	1(A)	3
4	1 mi. downriver Paunagaktuk Bluff	28 June	-	4
5	5 mi. NE of Chopper bench mark	28 June	-	4
6	upper Tuluvak Bluff	28 June	1(A)	5
7	middle of Tuluvak Bluff	28 June	1(V)	4
8	mouth of Outpost Creek	29 June	-	4
9	9½ mi. upriver Gubik Gas Well	29 June	3(A)	-
10	7 mi. upriver Gubik Gas Well	29 June	-	5
	GYRFALCON			
1	¼ mi. north of the western most end of the bluff at the big bend of the Chandler River	27 June	-	3
2	2 mi. west of mouth of Trouble Creek	28 June	-	3
3	1½ mi. upriver from mouth of Outpost Creek	29 June	1(V)	2
	PEREGRINE FALCON			
1	Paunagaktuk Bluff	28 June	2(V)	2
2	middle of Tuluvak Bluff	29 June	4(V)	-

"V" = eggs viable; "A" = eggs addled

TABLE VI

1972 GOLDEN EAGLE NESTS ON THE CHANDALAR RIVER

EYRIE NUMBER	EYRIE LOCATION	DATE OF OBSERVATION	NO. OF YOUNG
1	East Fork, 8 mi. upriver from confluence with North Fork, right limit of river	9 July	(inactive)
2	East Fork at mouth of Crater Creek, left limit of river	11 July	1
3	3½ miles upriver from mouth of Zimmerman Creek, East Fork, left limit of river	12 July	3
4	Confluence of Middle and East Forks, right limit of river	13 July	2

TABLE VII

FALCON EYRIES ON THE TANANA RIVER - 1970-72

EYRIE NUMBER	DATES OF OBSERVATIONS 1970	1971	1972	NO. OF LIVE YOUNG 1970	1971	1972
1	7/4	7/29	7/25	3	?	2
2	7/5	7/30	7/26	3	3	2
3	7/7	I	I	3	-	-
4	I	7/31	7/28	-	3	0
5	7/8	I	I	1	-	-
6	7/9	8/1	7/29	4	3	3
7	7/16	I	I	2	-	-
8	7/15	I	I	-	-	-

EYRIE LOCATIONS

1 On Tower Bluff, right bank of river across from mouth of Robertson River

2 6 miles downriver from mouth of Robertson River, right bank

3 12 miles upriver from the mouth of the Johnson River, right bank

4 Upriver end of Johnson Slough, one mile directly north of the mouth of Berry Creek

5 8 miles below mouth of Johnson River, left bank

6 At mouth of Indian Creek, about 8 miles upriver from Big Delta

7 One mile upriver from the Richardson Roadhouse, right bank

8 4 miles downriver from the mouth of the Chena River, on inland cliff not visible from the river

I = Eyrie site inactive, no falcons observed

TABLE VIII

RELATIVE ABUNDANCE OF LARGE MAMMALS
ALONG THREE ALASKAN RIVERS IN 1972*

RIVER	MOOSE	BLACK BEAR	GRIZZLY BEAR	WOLF
CHANDLER	XXX	0	X	XXX
CHANDALAR	X	X	0	X
TANANA	XX	X	X	X

* Based on sign and direct observations

XXX = abundant
XX = moderately common
X = uncommon
0 = no sign observed