BLACK BRANT OF THE LOWER KASHUNUK RIVER, ALASKA

Glen A. Sherwood

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by

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Black brant of the Lower Kashunuk River, Alaska, June, 1961.

INTRODUCTION

The black brant (*Branta nigricans*) is an important and avidly sought after species of coastal waterfowl. They offer gunners fine sport and top table fare from Alaska to Baja California. Because the brant numbers had been declining throughout the 1950's, the Alaska Department of Fish and Game instigated a black brant research project in hopes of uncovering the factors that had, and probably would again, reduce the brant population to another low. In addition, it was felt that the study should attempt to learn everything possible about the brant on the nesting grounds.

The project is scheduled to run for a period of three years, 1961 through 1963. This report covers the activities of the author from June 1 to July 25, 1961.

Personnel included Peter Shepherd, project supervisor, the author, Jude Henzler, and Jack Paniyak, native of Chevak, Alaska.

OBJECTIVES

1. To determine black brant mortality factors on the nesting grounds.

2. To determine the breeding ground phenology of the black brant.

3. To determine reproductive success of the black brant.

4. To determine black brant behavior activity on the nesting grounds.

5. To determine the extent and significance of black brant re-nesting.

THE STUDY AREA

The Kashunuk River is one of numerous streams which comprise, in part, the vast 20,000 square mile Yukon-Kuskokwim delta (Figure 1).

The study area, about 212 acres in size, is located along the Lower Kashunuk River approximately three river miles or two air miles from the Bering Sea coast (Figures 2 and 3). It is a tidal flat composed primarily of a grass-sedge combination inter-mingled with many small ponds, which are a few inches to about two feet in depth (Figure 4).

The dominant plants on the area are Elymus sp., and Carex sp. with the Carex predominant closer to the river and giving way to the Elymus as one moves inland.

The entire study area, as is much of the coastal delta, is only six to 12 inches above the normal high tide mark, and, hence, is subject to flooding.

PREVIOUS WORK

The general area of the Lower Kashunuk River and Hooper Bay region have been used for waterfowl studies by a number of other investigators in the past. Individuals and the

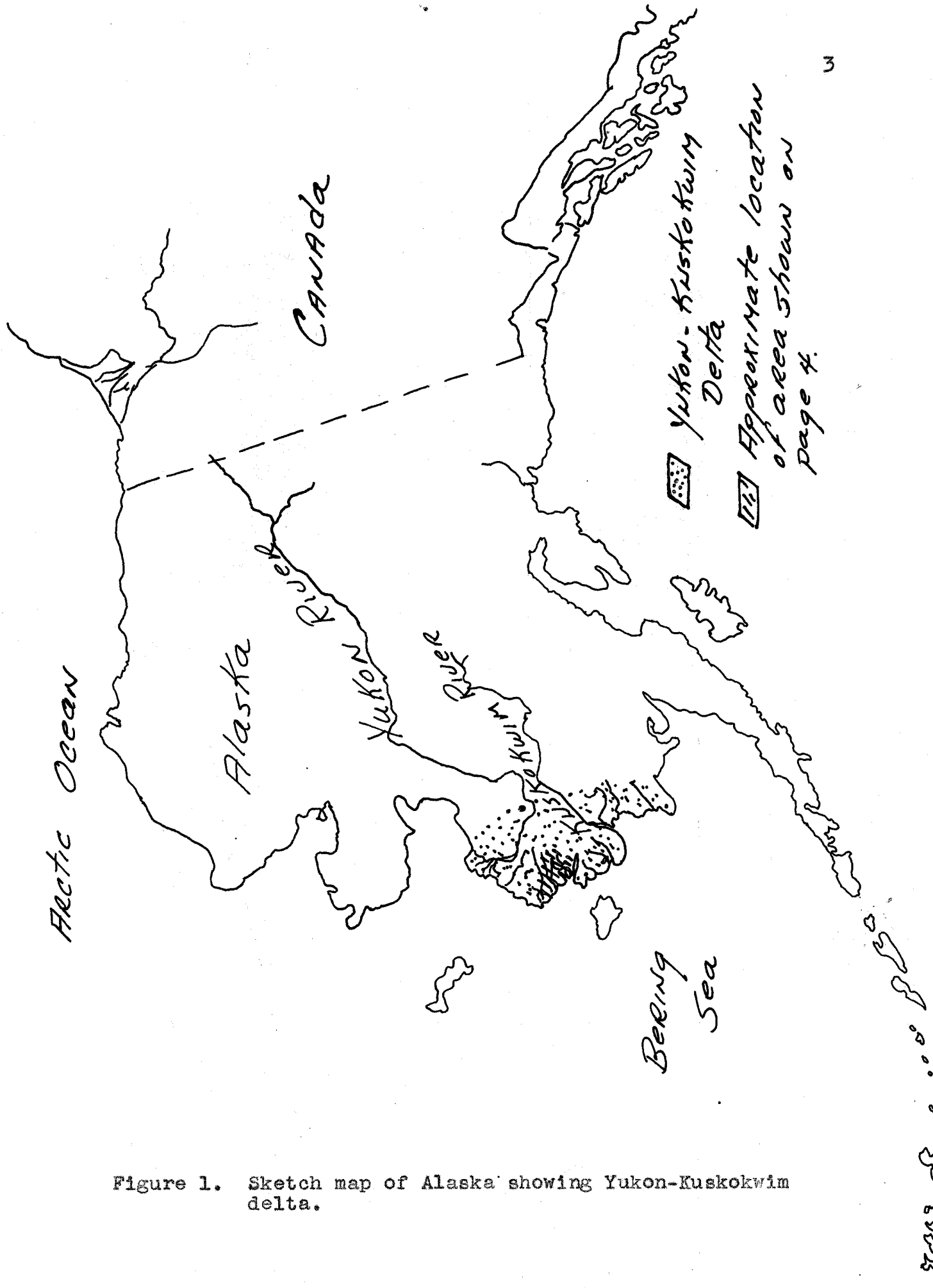

Figure 1. Sketch map of Alaska showing Yukon-Kuskokwim delta.

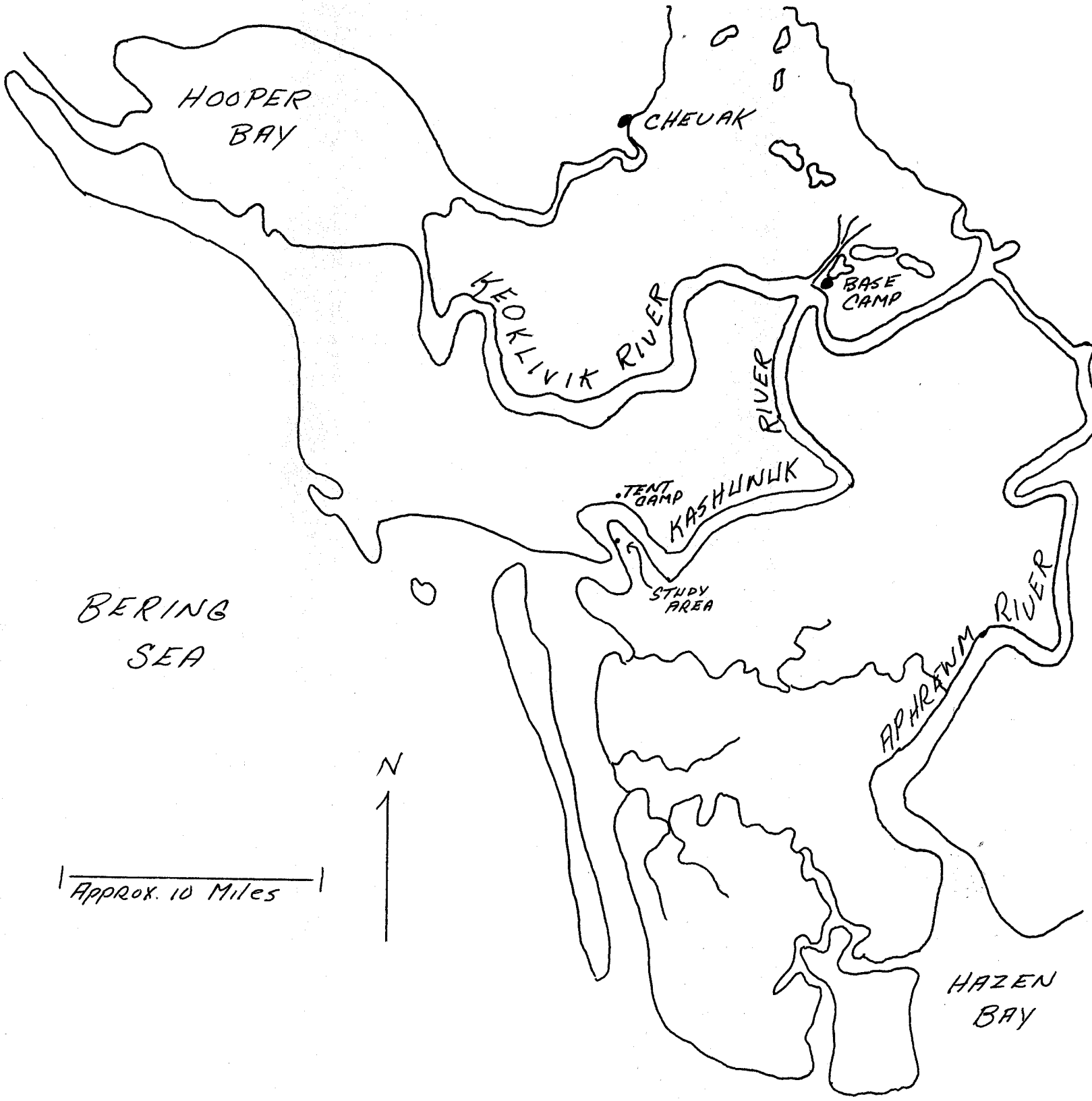

Figure 2. Sketch map showing Lower Kashunuk River and Hooper Bay region of Alaska.

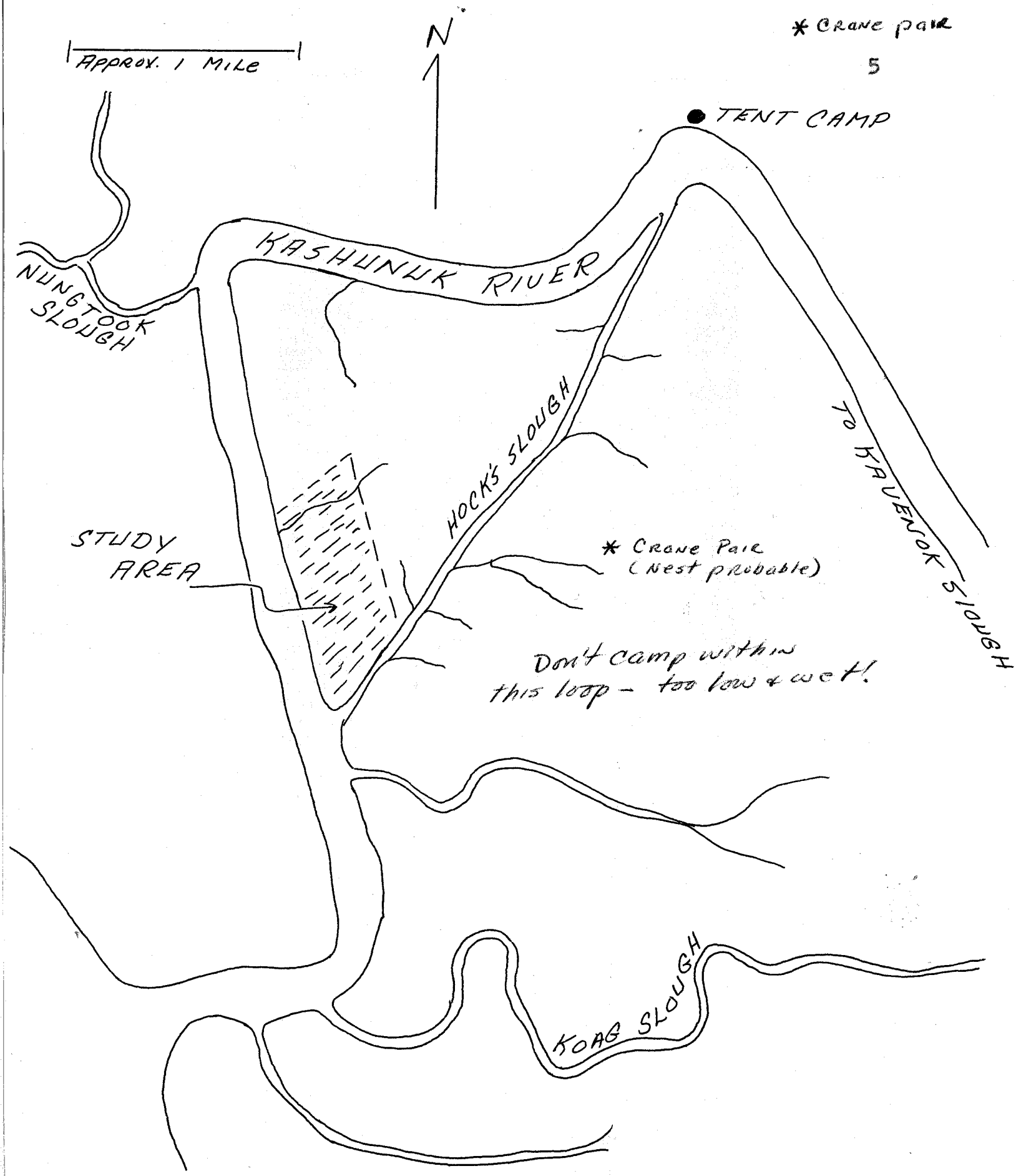

Figure 3. Sketch map showing location of study area and sloughs along the Lower Kashunuk River, Alaska.

Figure 4. General view of black brant habitat on the study area, June, 1961.

years they were in the area include E.W. Nelson, 1879; Olaus J. Murie, 1924; Herbert Brandt, 1924; H. Boardman Conover, 1924; Frank Dufresne, 1924 and 1945; C.E. Gillham, 1941; Sigurd T. Olson, 1951; Paul Adams, 1953; and Russell R. Hoffman, 1954.

WEATHER

Weather conditions during June and July of 1961 along the Lower Kashunuk River were characterized by almost unrelenting winds ranging in force from approximately five to 50 miles per hour, but generally in the 15 to 25 mile per hour class. Cold cloudy days were common in June with the daily temperatures estimated between 38 and 50 degrees, except for three days when the temperature climbed to about 60 degrees. July was somewhat warmer than June; however, it was a rare day either month when field work was conducted without a heavy jacket.

During June precipitation was noted on 13 days, and on ten of the first 25 days of July.

Weather conditions were the most severe on June 30 and the early hours of July 1 when a coastal storm was in process.

The adverse weather prevented field work on 13 days during June and July.

EQUIPMENT AND PROCEDURE

A large 18-foot boat and a smaller 15-foot run-about

were used during the study; however, it was soon apparent that the smaller boat was totally inadequate as well as dangerous for use on the often rough Kashunuk River. Outboard motors to propel the boats included a 40 horse-power Evinrude, an 18 horse-power Evinrude, and a ten horse-power Johnson. The 18 horse was swamped and capsized with the smaller boat during the June 30 storm, and hence was lost for further use. The 40 horse proved to be the work-horse and most adequate outboard; however, it caused many delays with constant breakdowns. As a spare the ten horse Johnson worked out very well; none-the-less, it was too small and too slow an outboard for constant use on the Kashunuk River.

Aluminum rods painted bright orange were used to mark the nests. Rods of four-foot and 18-inch lengths were employed. It was found that the shorter rods were inadequate, as a search had to be conducted each time to locate the nests marked with the 18-inch rods. A total of 140 nests was marked, 60 with the long rods and 80 with short rods. All of the nests marked with the longer rods were easily found on each visit to the area; however, eight nests marked with the shorter rods could not be found again after the original finding.

The study area and marked nests were re-checked periodically from June 8 to July 4. The frequency of re-visits was governed by hatching activity and weather conditions.

Breeding ground phenology, mortality, and behavior were determined primarily by direct observation on the study

area, by brood runs, and by banding results.

Brood runs were conducted periodically along the Kashunuk River, Hock's Slough, Koag Slough, Nungtook Slough (Figure 3), and Kavenok Slough, which was located about eight miles upstream from the tent camp.

Two-inch mesh chicken wire was used for the large permanent trap. Wire of four-foot height was used for the pot of the trap, and a three-foot height was employed for the wings. The large trap was placed near the mouth of Koag Slough (Figure 5).

A much smaller trap made of half inch mesh net, and about 30 feet long, was used to trap the downy brant (Figure 6). The smaller trap was a necessity because the broods were spread out and it was essential that we quickly move the trap to wherever the broods were found. Jack Paniyak showed us how to use the tiny trap. It worked very well. I was amazed that three men could walk a group of adult and downy brant, numbering up to 70, into a trap that was so small and yet so obvious.

TRANSPORTATION COMMUNICATION AND SUPPLY

A study conducted in a remote coastal tundra area presents certain problems which are not usually confronted in less secluded areas.

Our base camp at old Chevak was approximately 40 miles by water to the closest native village of Chevak. We did not have a radio for communication with Chevak or any other

Figure 5. Large trap located near the mouth of Koag Slough, July, 1961.

Figure 6. Small mesh trap used for trapping brant broods, July, 1961.

point. Therefore, anytime we needed gasoline (until a number of barrels were brought to base camp by a hired barge in late June), outboard motor parts, mail, or other supplies we were forced by necessity to motor to Chevak to get what we could or radio to Bethel and have the equipment flown out on the twice weekly mail flight. We had to make the trip to Chevak eight times during the course of the study.

The lack of communication and distances involved behooved us all to be particularly careful to insure that we were not involved in a serious accident.

Of course there are no roads in the vast delta area, and transportation by foot is a difficult, if not impossible, task due to the countless rivers, sloughs, lakes, ponds, and spongy character of the tundra itself.

THE NESTING STUDY

Arrival

Jack Paniyak, reliable native observer, told me that the black brant usually arrive sometime around the middle of May. Assuming that the black brant have an incubation period of 24 days, similar to the American brant (Barry, 1956), then the arrival this year was probably between May 15 and 20. It would be desirable, perhaps, to be on the nesting grounds for the brant arrival, however, the period of May 15 to June 1 is break-up time and it is impossible for the planes to land at that time.

Nesting Site

The first day on the 212 acre study area was June 8, and at this date the brant had already completed their clutches and were, as a majority, well advanced in the incubation process.

A thorough search for nests revealed an extremely high nesting density (Table 1). Brant nests on the area totaled 260; cackling goose nests, 49; spectacled eider nests, 36; pintail nests, seven; common eider nests, two; green-winged teal nests, one; and Steller's eider nests, one.

Table 1. Waterfowl nests found on the study area, June, 1961.

Species	Number of Nests
Black Brant	260
Cackling Goose	49
Spectacled Eider	36
Pintail	7
Common Eider	2
Green-winged Teal	1
Steller's Eider	1
Total	356

Brant nests were found throughout the area; however, they were most abundant in the short sedge within 300 to 400 yards of the river. The birds did not seem to choose a nest site with abundant cover. In fact, the nests were

generally quite obvious. The brant nests were often placed on small islands (Figure 7) in the ponds, or very close to the water's edge (Figure 8). Better than one-half of the nests were placed within five feet of the water (Table 2). Further, 21 nests of 127 had been located within one foot of the water's edge.

Table 2. Distance from nest to water, June, 1961.

Distance	Number of Nests	Percent
1 - 5 feet	68	53.5
6 - 10 feet	30	23.6
11 - 15 feet	12	9.5
16 - 20 feet	9	7.1
21 - 50 feet	8	6.3
Totals	127	100.0

The nest material was almost entirely down, except that some of the birds used a little grass and/or sedge for a base in the nest scrape. Usually the down was luxuriantly abundant; however, this factor was also variable, and on several occasions brant nests were located with scarcely any down and certainly not enough to cover the eggs.

We also had some difficulty differentiating brant nests from cackling goose nests. As both birds used varying amounts of down, and egg size and color differences were not readily apparent, the best criteria proved to be the amount of grass and/or sedge interwoven into the down. The brant

Figure 7. Black brant nest on tiny island. Note the abundant down, June, 1961.

Figure 8. Black brant and nest near water's edge. Note nest marker in the foreground, June, 1961.

used almost pure down and the cacklers used down mixed with varying proportions of grass and/or sedge.

Territory

The brant nest in a semi-colonial situation, and the closest nests were 20 to 25 feet apart. Territorial behavior was exhibited countless times. Head lowering, thrusts, nipping, and aggressive rushes were observed on numerous occasions. I did not witness any genuine battles between brant, and the little skirmishes lasted only briefly with the intruder always driven from the territory; however, "driven out" was often only a matter of a few feet.

The Clutch

Egg-laying probably began this spring about May 18 - 20. Clutch size of 135 nests ranged from one to five, and the average was 3.64 (Figure 9).

Incubation

Incubation probably began about May 25, in the case of the earliest nesters, and terminated on June 17 or 18. The very latest nesters did not terminate incubation until June 30. Period of incubation is assumed to be about 24 days.

Hatching Dates

Sixty brant nests were examined on June 16 on the study area, and in three, eggs were pipping. In one of the three nests a gosling was found about three-fourths out of the shell. Thus, the first nests on the study area hatched during the late hours of June 16 or the early hours of June 17. (Figure 10). Weather conditions prevented field work on

Figure 9. Clutch of five black brant eggs, June, 1961.

Figure 10. Newly hatched black brant. Note the wet downy just emerging from the shell, June, 1961.

the 17th, and on June 18 we found that eight nests had hatched of 78 examined (Table 3). The last of the marked nests probably hatched early on June 30 as the eggs were noted pipping on the previous evening.

Table 3. Hatching dates of 115 marked black brant nests, June, 1961.

Date	Number of Nests Examined	Number of Nests Hatched	Percent of 115
June 16, 1961	60	0	0.00
June 18, 1961	78	8	6.96
June 19, 1961	45	4	3.48
June 20, 1961	97	22	19.13
June 22, 1961	36	7	6.09
June 23, 1961	45	18	15.65
June 24, 1961	32	17	14.78
June 25, 1961	40	16	13.91
June 27, 1961	26	14	12.17
June 29, 1961	10	8	6.96
July 1, 1961	2	1	.87
	Totals	115	100.00

Hatching Success

Of the 140 marked black brant nests, eight were never found again, and five were cackling goose nests. Therefore, nest fates are based on 127 nests (the original 140 minus the eight never found again, and the five that proved to be cackling goose nests).

The nesting success of 90.6 percent (Table 4) would undoubtedly be reduced if the nests had been marked at the

beginning of egg laying or even in the initial stages of incubation. A nest was considered successfully hatched if even one egg hatched. In 86 (74.8 percent) of the 115 successful nests all eggs hatched. One or more eggs failed to hatch in the remaining 29 (25.2 percent) nests.

Table 4. Nest fates of 127 marked black brant nests, June, 1961.

Nest Fate	Number	Percent
Successfully hatched	115	90.6
Destroyed (Avian)	6	4.7
Destroyed (Storm)	1	.8
Deserted	5	3.9
Totals	127	100.0

A total of 423 eggs was found in the 115 successful nests (Table 5). Of the total, 378 hatched, 17 were addled, 18 were sterile, seven were found with dead embryos in advanced stages of growth, and 3 were destroyed by avian predators.

Table 5. Fates of 423 eggs found in 115 black brant nests, June, 1961

Egg Fate	Number	Percent
Successfully hatched	378	89.4
Sterile	18	4.3
Addled	17	4.0
Dead embryo	7	1.6
Destroyed	3	.7
Totals	423	100.0

Avian Nest Destruction

Avian predators destroyed six brant nests during the course of the study. Avian egg predators included the mew gull, parasitic jaeger, and probably the long-tailed and pomarine jaegers. The glaucous gull displayed little or no interest in egg predation.

It seems strange that more nests aren't destroyed by avian predators because every nest site in the area must be obvious from the air whether the eggs are covered or not - obvious because of the abundant down and lack of vegetative cover. Apparently the avian predators do not investigate the nest sites unless the eggs are visible.

Nest Desertion

Of the five nests that were deserted (Table 4), four were deserted between June 18 and June 22, a period of some of our greatest activity, also, at a time when the brant were well advanced in the incubation process. In one case a nest desertion occurred when all four eggs were about to hatch - one egg had even pipped.

Brood Data

The first brood was seen along the banks of the Kashunuk River about a mile above the study area on the morning of June 18. Nine additional broods were seen before field work was completed that day (Table 6).

I attempted to classify broods into age classes similar to those described for duck broods by Gollop and Marshall (1954). This method proved unsatisfactory for use

with black brant. For example, a class I-b brood is typified by a "fading ball of fluff," but it is impossible to have a "fading ball of fluff" when the downy is a slate bluish-gray color to begin with. Another problem in classifying the broods is that the downies either dive or scatter up the banks of the sloughs before the observer can get a good look at them. Thus, to eliminate guess-work the broods are left un-classified in Table 6. The ever changing tides and their effect on brood activity constitutes another problem in conducting a satisfactory brood run. All sloughs were not visited on each brood count (Table 6).

Table 6. Average brood size of black brant, June - July, 1961.

Date	Number of Broods	Number of Young	Average Size
June 18, 1961	10	30	3.00
June 19, 1961	16	52	3.25
June 20, 1961	28	80	2.86
June 21, 1961	36	123	3.42
June 22, 1961	51	200	3.92
June 23, 1961	22	71	3.23
June 25, 1961	31	102	3.29
June 27, 1961	60	171	2.85
June 29, 1961	48	126	2.63
July 4, 1961	42	125	2.98
July 6, 1961	39	110	2.82
July 7, 1961	27	77	2.85
July 16, 1961	44	125	2.84
Totals	454	1392	3.07

Molt

The brant began gathering for the molt in increasingly larger numbers along the Kashunuk River from June 16 on. I saw the first flightless brant on June 27 in Hock's Slough. Non-breeding brant that gathered a mile or two down river were probably flightless prior to the above date.

Numbers of flightless brant increased each day (Figure 11), and by July 13 I estimated that better than 90 percent of the adult-sized brant were flightless.

On July 22 I noted the first large flock of 200-300 black brant take to flight again. Thus, the flightless period is approximately three to four weeks duration.

Departure

Jack Paniyak told me that the black brant begin to depart the Lower Kashunuk area about the middle of August, and none remain when the hunting season opens the first of September. Therefore, the young must be on the wing between 60 and 65 days of age, and begin their migration shortly after gaining flight ability.

MORTALITY FACTORS

Mortality factors which operate on the black brant nesting grounds include predation, storms and high tides, native hunting and egg collecting, and, probably, disease and parasites.

Predation

Undoubtedly, the greatest single mortality factor

Figure 11. Flightless black brant, Lower Kashunuk River, Alaska, July, 1961.

operating on the nesting grounds is avian predation of the downy brant by glaucous gulls. A study by Olson (1951) in the same area vividly pointed this out, also.

The glaucous gulls began to show up over the nesting grounds as soon as the young brant began to hatch.

I witnessed 24 downy brant killed by glaucous gulls during the study. Better than half of the kills were caused by our disturbance with boats or banding activities. None-the-less, the glaucous gulls find hunting for downy brant easier than fishing the Kashunuk River because the gulls can be seen over the nesting grounds or hovering over broods at anytime during the day. Jack Paniyak said that he was certain that there were more glaucous gulls around this year than any year that he can remember.

The glaucous gulls are large birds weighing between three and four pounds, and hence, are as big as, and often bigger than the adult brant. Although the brant are usually strongly defensive against the gulls, the downy brant need become separated from the adults by only a few feet for the gulls to readily snatch them up. Certainly the fact that the brant is a comparatively very small goose, combined with their semi-colonial society makes them more vulnerable to successful glaucous gull predation than any other geese on the delta. The cackling goose is also very small, but tends to nest non-colonially, and to use areas with more vegetative cover. I feel quite certain that the brant population fluctuations can be attributed, in part, to the

rise and fall of glaucous gull numbers on the nesting grounds.

Mammalian predation was non-existent on the study area. Several red foxes were seen up river near old Chevak, but none were observed anywhere near the brant nesting area. In fact, no mammals, nor mammal tracks of any kind, were seen on the study area.

Storms and High Tides

A tremendous storm struck the nesting area at 5:00 A.M. June 30 and continued for 29 hours. I was living alone at the tent camp (Figure 3) at the time, and estimated peak winds towards midnight at 45 to 50 miles per hour. I will never know what kept the tent on the ground as it jumped, flopped, bounced, and tore at the moorings for endless hours. The storm, out of a southerly direction, pushed an abnormally high tide over the coastal tundra area, and forced me to leave the tent at midnight in fear of being flooded out. Although the waters never quite reached the tent, the storm is an experience that I would rather not go through again. One man's effort in a tempest like that is insignificant and nearly useless. Seven hours were spent in the face of the storm just trying to salvage the capsized boat and motor.

A check of the study area on July 1 showed definitely, because of the new driftwood, that nearly two-thirds had been flooded. It was possible that the entire area had been inundated, but because of the lack of driftwood it was diff-

icult to determine with any degree of certainty.

Nest destruction directly attributable to the storm was probably slight as the storm struck on the very tail end of the nesting season. All of the marked nests, except two, had hatched prior to the storm. One of the two remaining nests probably hatched a few hours ahead of the storm as the eggs were pipping the evening before. Thus, only one nest was actually destroyed by the storm.

I have no statistically sound figures to back this up, but I feel that the storm indirectly caused some downy mortality, possibly excessive, by scattering the goslings and as the storm subsided the glaucous gulls moved in for repeated kills. It would be incredible if some of the downy brant didn't become separated from the parents in the face of such a powerful, un-relenting wind. Jude Henzler and I did note two downy brant wandering helplessly about the study area some seven hours after the storm had abated.

The natives of Chevak told me that this was an early storm, and that most storms do not hit until late July or early August. If the storm had hit a few days earlier, or the nesting season started a few days later, direct nesting losses would have been catastrophic.

Brood runs following the storm did not show any definite drop in average size, however, I had to cover about twice as much area to observe as many broods as before the storm. Broods in Hock's Slough fell to almost nil, and prior to the storm 20 to 30 broods could readily be counted.

Of course, the adults with their broods may have merely departed Hock's Slough because of my disturbance, or because of the storm, but the scarcity of broods became evident immediately after the storm.

After the storm I never felt that I was seeing an adequate sample of the number of broods that should have been in the area considering the nesting density. This can only be backed up by the fact that Jude Henzler, Jack Paniyak, and I traveled well up the sloughs and checked a number of tundra areas and ponds following the storm. It is possible that we did not check the right areas or go far enough, but I am personally convinced that there was some brood mortality caused indirectly by the storm.

Finally, in a banding sample of 800 brant (including only 11 downies), 20.5 percent were adult females with incubation patches indicating nest destruction or brood loss. Whether the brood losses can be attributed to the storm, or not, is unknown.

Native Hunting and Egg Collecting

The natives, undoubtedly, could take a toll of the brant and eggs, but brant hunting and egg collecting is insignificant, if not non-existent in the Lower Kashunuk River area. Jack Paniyak told me that the brant nesting grounds on the Lower Kashunuk are too far a distance to travel for the natives of Chevak, the closest village some 60 miles by water away. None-the-less, if the natives chose to collect eggs in a brant nesting area the results could be devastating because of the open terrain, the semi-

colonial nesting pattern and the ease in which the nests can be located.

Disease and Parasites

No adult-sized brant were found dead during the study. Therefore, mortality due to disease or excessive infestation by parasites among the larger birds in the Lower Kashunuk River area is assumed to be insignificant for the nesting season of 1961. This assumption excludes early downy mortality in or near the nest as several downies were found dead, but this was considered to be normal hatching mortality.

TRAPPING AND BANDING

We trapped and banded the first group of black brant on July 10. Circumstances beyond my control prevented us from banding earlier, however, banding of non-breeding adults, sub-adults, and immature birds could have been initiated a week sooner. On the other hand, banding of downy young should be delayed until they are three to four weeks old because the bands will slip off and they are more susceptible to trap mortality and glaucous gull predation prior to that age.

Black brant trapped and banded totaled 1,042 including 132 downies and 219 adult females with incubation patches (Figure 12).

We banded 800 brant before attempting brood trapping and banding. Of the sample of 800 birds, 164 (20.5 percent) were adult females with incubation patches, and 11 (1.4 per-

Figure 12. Adult female black brant showing an incubation patch, Lower Kashunuk River, Alaska, July, 1961.

cent) were downy young. This would appear to be a significant number of females without broods, however, comparative figures of previous banding efforts are lacking.

The 11 downies mentioned above were trapped on July 14 and released with a pair of adult birds. They crossed the Kashunuk River and the adopted parents strongly defended the group of downies against six to eight glaucous gulls. Then upon reaching the opposite shore the group was joined by several other adult-appearing brant. We felt certain that the young were completely safe now, but to our amazement the entire group ran from the attacking gulls in a panic over the mud-flat with the slower downies strung out behind. It was just a matter of minutes before the goslings were completely wiped out by glaucous gulls.

Although we never witnessed a similar tragedy of such proportions, there were no doubts in our minds that our banding activities were causing extremely high downy brant mortality because the glaucous gulls were ever present. Even though one man often had to "ride shotgun" on the gulls it deterred them very little.

In our efforts at trapping broods we banded 242 brant including 121 downies, which gave an exact 1 : 1 adult to downy ratio in the sample.

Although we had hoped to band more downies, severe weather bordering on storm conditions prevented us from going afield the final three days, July 23-25. To complicate matters the 40 horsepower outboard motor was crippled, and,

lastly, the seams of the boat opened up on the last day, which would necessitate major repair work.

Five brant, other than downies, received broken legs during our banding operations.

BEHAVIOR

Throughout the study I had an opportunity to observe various instances of black brant behavior. While the observations may or may not be of importance they are of interest, and are here described with that in mind.

The female brant removes so much down in preparing the nest that she actually plucks herself bare (Figure 13).

Black brant, as mentioned earlier, exhibit territorial behavior. This includes head bobbing and weaving, rushes, attacks, and an occasional brief aerial chase. The head and neck are almost constantly lowered when an intruder begins to encroach upon the territory. I doubt that any of the conflicts are serious enough to injure the combatants, and invariably the intruder is forced out.

On one occasion I noted a brant and a cackler momentarily square off, and on another I observed five brant making threatening gestures towards four cacklers which were standing about 25 feet away.

The brant displayed varying responses at my approach to the nest. Most of the birds flushed at distances from 40 to 150 feet. A few allowed me to approach within 15 feet and one female let me come to within three to five feet of her several times (Figure 14) before she waddled off the

Figure 13. Female brant taking flight. Note the cleanly picked stomach, Lower Kashunuk River, Alaska, June, 1961.

Figure 14. Female black brant that allowed me to approach within a few feet several times, Lower Kashunuk River, Alaska, June, 1961.

nest, but she was the exception.

Flushing distance did not seem to be altered by stage of incubation or presence of young. For example, one female flushed at 60 feet and she had four downies on the nest.

With two notable exceptions, the brant always vacated their nests meekly, and did not threaten me. The usual pattern was for the female to flush and fly off about 100 to 150 yards calling repeatedly until the male joined her, or to simply walk off the nest, calling again until joined by her mate, to a point 25 to 50 yards off. Eventually the brant would return almost immediately to the nest following my disturbance. I suspect that the later the stage of incubation the quicker they returned, however, it also seemed that they were becoming more conditioned to my presence.

One of the exceptions occured on June 20. As I approached nest number two I noted the male standing a few feet away from the incubating female. His head and neck were immediately lowered as I moved to within 20 feet of the nest. It was at this point that I noted that he was protecting a downy as well as the nest. (It later turned out that this was an "adopted" gosling.) As I slowly moved closer the male went into a vigorous defense with hissing, head bobbing, forward thrusts, and spreading his wings, which made him appear rather formidable (Figures 15 and 16). He gave little ground when I called his bluff, and when I would back away a few steps he would rush at me, stopping

Figure 15. Defensive display of adult male black brant, Lower Kashunuk River, Alaska, June, 1961.

Figure 16. Defensive display of adult male black brant, Lower Kashunuk River, Alaska, June, 1961.

about four feet away. Female number 44, the other exception, was almost as defensive with her hours old brood. I had to admire the courage of these two exceptional birds against an enemy so much larger than themselves.

The brant were always very defensive and aggressive towards avian predators, except during banding. On four occasions I observed brant chasing jaegers out of the immediate area. The brant also attacked the much larger glaucous gull, with less effectiveness, but they were persistent enough that the gull usually gave up. Black brant emit a very characteristic "growl" when gulls or jaegers pass overhead too closely. They will do this when downy brant are present as an individual or in a group, at which time it sounds like a chorus of "growls".

The brant are vocal birds, and their "cronking" can be heard at almost any time on the nesting grounds.

On June 18 I noted that one of the early broods and their parents was being followed by seven adult-appearing brant, much to the distress of the parent birds. The seven acted like they were simply curious about the new-comers.

I observed on June 23 a pair of brant being very defensive over their brood, and they were being aided by another pair of adult-sized brant. I wonder if the other pair could have been the young of the previous year.

Three times I saw brant caring for a single gosling before their own clutches had hatched, but, apparently, they will not tolerate other young because I found a young

gull lying dead beside an active brant nest.

I found two nests in which there were dead or dying goslings. Obviously, they had hatched after the parents had departed earlier with other young. On the other hand, twice I witnessed brant trying repeatedly to encourage sick or dying downies to follow them.

Downy brant a few days old attempt to dive when approached on water, but they are so bouyant that they can only get their heads beneath the surface of the water.

We found the brant to be extremely swift afoot during the molt, and, in fact, imposeible to run down. This fact amazed us because of their comparative small size.

SUMMARY

1. This report covers the period from June 1, 1961 to July 25, 1961.

2. The study area was located on the Lower Kashunuk River, Alaska. Tidal flats of grass and sedge dominated the area.

3. Weather conditions were marked by constant wind, cool temperatures, and cloudy, rainy days.

4. Major equipment consisted of an 18 foot boat, a 15 foot run-about, and three outboard motors of ten, 18, and 40 horsepower.

5. Black brant nests totaled 260 on the 212 acre study area, and 140 nests were marked for the nest study.

6. Clutch size of 135 nests averaged 3.64.

7. The first nests hatched on June 16 and the last on June 30.

8. Of 127 nests, 115 (90.6 percent) successfully hatched, 6 (4.7 percent) were destroyed by avian predators, one (0.8 percent) was storm destroyed, and five (3.9 percent) were deserted.

9. Of 423 eggs in the 115 successful nests, 378 (89.4 percent) were successfully hatched, 18 (4.3 percent) were sterile, 17 (4.0 percent) were addled, seven (1.6 percent) contained dead embryos, and three (0.7 percent) were destroyed.

10. Average brood size of 454 broods was 3.07.

11. The first black brant observed flightless was on June 27. They were seen on the wing again by July 22.

12. Gull predation was the single greatest mortality factor on the nesting grounds.

13. A savage storm on June 30-July 1 had uncertain, but possibly serious, mortality effects on the downy brant.

14. Black brant trapped and banded totaled 1,042 including 132 downies, and 219 adult females with incubation patches.

15. Numerous examples of black brant behavior were recorded.

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