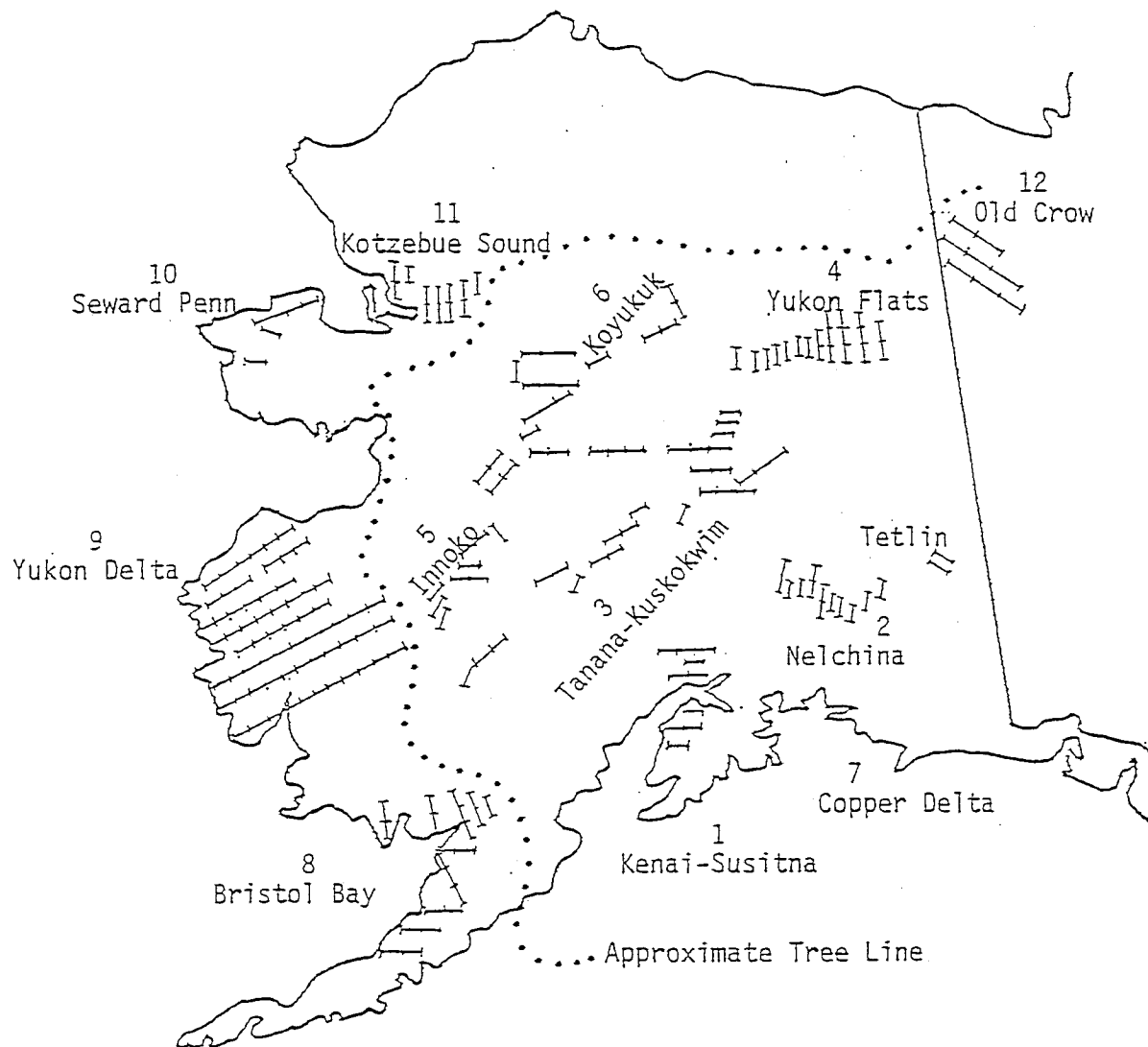


~~500~~
14

ALASKA - YUKON
WATERFOWL BREEDING POPULATION SURVEY

May 16 to June 13, 1998



By

Bruce Conant
Deborah J. Groves

U.S. Fish and Wildlife Service
Juneau, Alaska

TITLE: Waterfowl Breeding Population Survey:
Alaska-Yukon (Crew Area 1)

STRATA COVERED: 01, 02, 03, 04, 05 ,06, 07, 08,
09, 10, 11, 12

DATES: May 16 to June 13, 1998

DATA SUPPLIED BY: Bruce Conant and Deborah J. Groves
U.S. Fish and Wildlife Service, Juneau, Alaska

ABSTRACT

Alaska-Yukon was again blessed with a generally widespread, early spring break-up in the interior and on the North Slope with perhaps a more normal spring phenology on the western tundra. Overall, there was little flooding and habitat conditions should be basically favorable for waterfowl production throughout most of the Alaska-Yukon waterfowl nesting habitat.

Generally, duck populations increased in size from 1997. Changes in duck populations by category are as follows. Dabblers are up 41% from last year, are 56% above the 10-year average, and are 117% above the long-term mean. Divers are up 23% from 1997, up 3% from the 10-year average, and are up 10% from the long-term mean. Miscellaneous are up 39% from 1997, down 2% from the 10-year average, but are down 16% from the long-term mean. Total ducks are up 37% from 1997, up 36% from the 10-year average, and are 59% above the long-term mean.

Overall, goose production should be above average in the interior but only average on the western tundra.

Trumpeter swan production should be above average throughout most of Alaska. Tundra swan production should be perhaps only average on the western tundra and above average on the North Slope.

INTRODUCTION

This year Migratory Bird Management - Juneau completed the 42nd consistent, standardized waterfowl breeding population survey in Alaska. This data set continues to increase in value as a basis for continental, flyway, and state-wide management of the waterfowl resource. The continuation of this historic survey is highly recommended.

We are indebted to, Joe Wulfkuhle, Bill Filkins, Tim McMenemy, Mark Patrick and others at OAS for providing vital maintenance for the aircraft. Glenn Elison, Russ Oates, John Sarvis and others in the regional office provided needed support. Special thanks to Rod King, Mike Rearden, Daryle Lons, Tom Early, Sally Jo Collins and Leslie Kerr for providing housing and/or vehicles or other logistical support. We enjoyed and benefited much from visiting with refuge personnel and others, especially in the bush. We again used a custom computer program created by Jack Hodges for data entry and analyses. We recorded habitat conditions in Alaska-Yukon with our hand held video camera during the survey and also provided an interview in the foothills of the Brooks Range for inclusion in the annual waterfowl status audio visual production by MBMO for the continent.

METHODS

Survey methods follow "Standard Operating Procedures for Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America", as revised in 1987. Pond data presented in Table 9 are three year averages from past pond counts using standard methods.

For the sixth year a Global Positioning System (GPS) unit in the aircraft was used for precise navigation along transect lines. The installation of a second GPS unit married to a large scale Course Deviation Indicator (CDI) on the pilot's side of the instrument panel further eases the piloting duties and enhances the repeatability of flying segments which have poor landmarks. The combination of GPS navigation, experimental satellite transmission of data to ground based computers, and recent advances in voice recognition technology offer enticing possibilities for the future. Perhaps someday voice observations attached to precise locations from anywhere over the earth can be sent directly from survey aircraft instantaneously to computers anywhere on the planet. At such a time, one could watch the results of the North American Waterfowl Population Survey accumulate before one's eyes at a computer screen at command central at Laurel, Maryland.

Data entry into note book computers, in the field, has now become the standard operating procedure for continental aerial waterfowl surveys. All stratum summaries and tables for this report were again computer generated. Data were provided to the Office of Migratory Bird Management (MBMO) via electronic mail from Juneau after completion of the survey.

The survey design contains 12 strata with 232 segments. The Copper River Delta (stratum 07) was surveyed again this year and the results included in place of the average figures used in past years. The Alaska unit contains 214 segments each 16 miles in length and 10 segments each 8 miles in length. The Yukon unit has 8 segments each 18 miles in length. All segments were flown again in 1998.

The unique turbine Beaver (N-754) was again used for the survey making its twenty second consecutive trip around the course in about 100 hours of flight time. As always, it made completion of the survey both safe and efficient. This unique aircraft has provided the platform from which observations were made for over half the history of the survey. It continues to be recognized as an Alaskan harbinger of spring.

A six year (1986-1991) helicopter-fixed wing comparison study in Alaska resulted in the development of new visibility correction factors (VCFs). New average rates specific for waterfowl habitats in Alaska; boreal forest (strata 1-7), tundra (strata 8-11) and the Old Crow Flats in Canada (stratum 12) were employed starting in 1992 and also were applied to the historical data set.

Because of a slight difference in the application of the VCFs for a few specific years (1986-1991), the data presented here are slightly different for some species for those years than those presented by MBMO. Both interpretations reflect a major step in the direction of presenting a more accurate picture of continental duck populations for the last half of this century. Also, in our analyses we do not apply any VCF to Canada Goose observations nor do we double single observations for Canada and White-Fronted Geese or Swans as MBMO does.

We now have a publication out which analyzes the history of loon observations during this survey and also from the North Slope. Tables 5,6 and 7 have been added to this report which detail ten year trends in red-throated, Pacific and common loons for only our survey areas respectively.

WEATHER AND HABITAT CONDITIONS

This year in Alaska we had delusions of a super early spring break-up, prompted by the widespread, warm temperatures experienced in late March. A cool April dashed our dream and the result was, as Brina Kessel says, a "normal early" spring throughout most of the interior. A dry summer and fall last year coupled with below average snowfall made parts of the interior extremely dry this spring. On the western tundra the cool weather coupled with lots of precipitation continued in May and June resulting in perhaps a "normal" spring phenology there. The North Slope of Alaska is reported to be opening up early and the Old Crow Flats in the Yukon was completely thawed out and very green during the survey. Only minimal flooding from spring break-up was noted throughout the survey areas, although the western tundra was definitely on the wet side. We experienced some windy weather during parts of the survey which could have affected waterfowl observableness to an unknown degree.

BREEDING POPULATION ESTIMATES

A. Ducks: Changes in selected species and groups are as follows with all species presented in Table 2 (numbers in thousands).

Species	1998 Indices	Percent Change From		
		1997	10-year mean ¹	long-term mean ²
Mallard	836.1	+ 43	+ 96	+189
Wigeon	1196.9	+ 26	+ 80	+181
G.W. Teal	678.9	+ 33	+ 35	+137
Shoveler	852.5	+ 71	+ 102	+338
Pintail	946.0	+ 46	+ 8	+ 8
Total Dabblers	4510.7	+ 41	+ 56	+117
Canvasback	105.4	+135	- 5	+ 25
Scaups	927.9	+ 16	- 0	+ 3
Bufflehead	46.7	+ 16	+ 16	+ 8
Total Divers	1217.7	+ 23	+ 3	+ 10
Oldsquaw	90.9	+ 33	- 8	- 38
Eiders	13.5	+ 2	+ 33	- 55
Scoters	348.4	+ 48	- 2	- 9
Total Miscellaneous	477.4	+ 39	- 2	- 16
TOTAL DUCKS	6205.8	+ 37	+ 36	+ 59

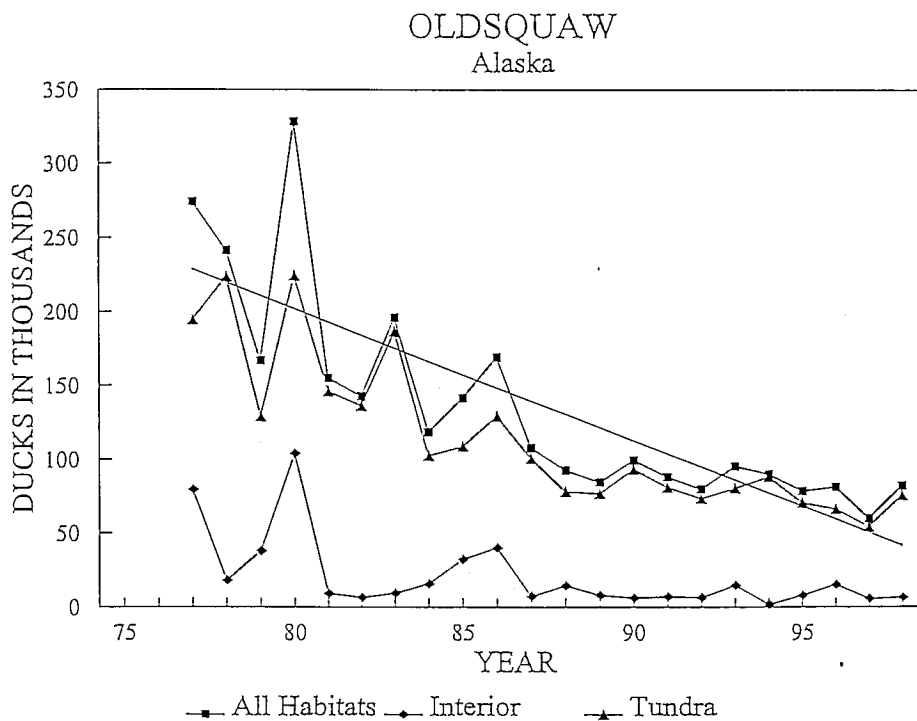
¹ Average for Alaska-Yukon (strata 1-12) for 1988-1997.

² Average for Alaska-Yukon (strata 1-12) for 1957-1997.

Total dabblers increased dramatically from 1997 and are above both the 10-year average and the long-term mean. Many flocked dabblers were noted this year, usually a sign of displaced prairie nesters. Mallard, wigeon, shoveler, green-winged teal, and pintail numbers all increased substantially from last year. In Alaska all populations of dabbler species are well above both averages, except for pintails which are only slightly above both averages.

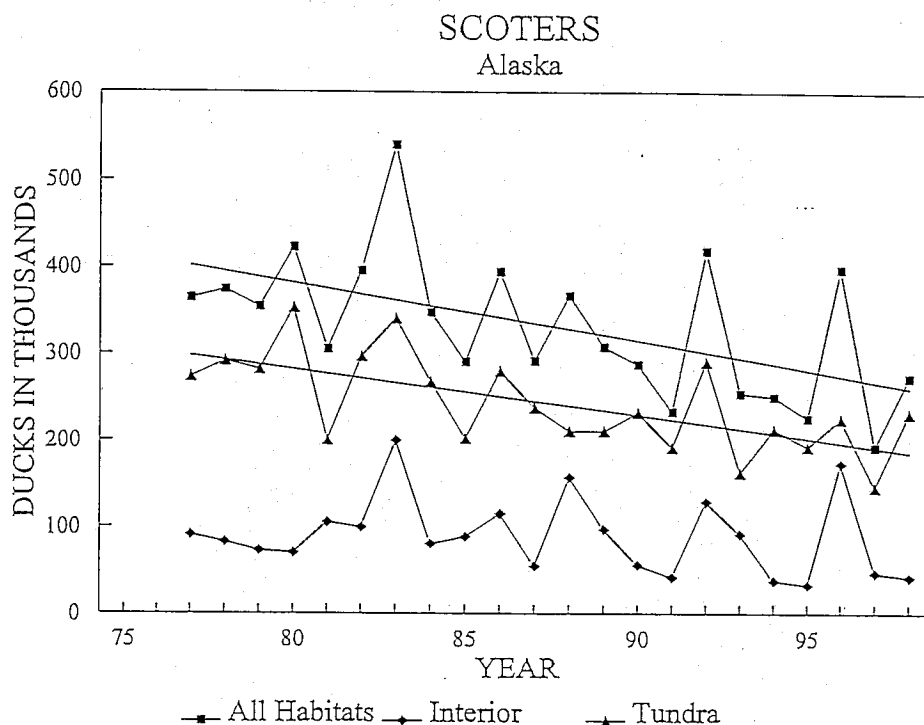
Canvasback populations increased sharply from last year and are slightly below the 10 year average but above the long term mean. Scaup numbers increased significantly from 1997, both in the interior and on the tundra. Bufflehead numbers increased from last year and are above both averages.

Oldsquaw numbers increased from last year but remain significantly below the long term mean. The steady downward slide needs to be investigated. Here is a graphic presentation of the last 22 year trend in the oldsquaw index.



Based on a small sample, the eider index shows a slight increase from last year but remains well below the long term average.

Total scoter numbers increased substantially from last year but are below long term averages. The tundra scoters and those on the Old Crow Flats accounted for all of the increase. Interior scoter numbers decreased slightly from last year. While not as dramatic of a decrease as oldsquaw, the last 22 year graph of the scoter index is alarming.



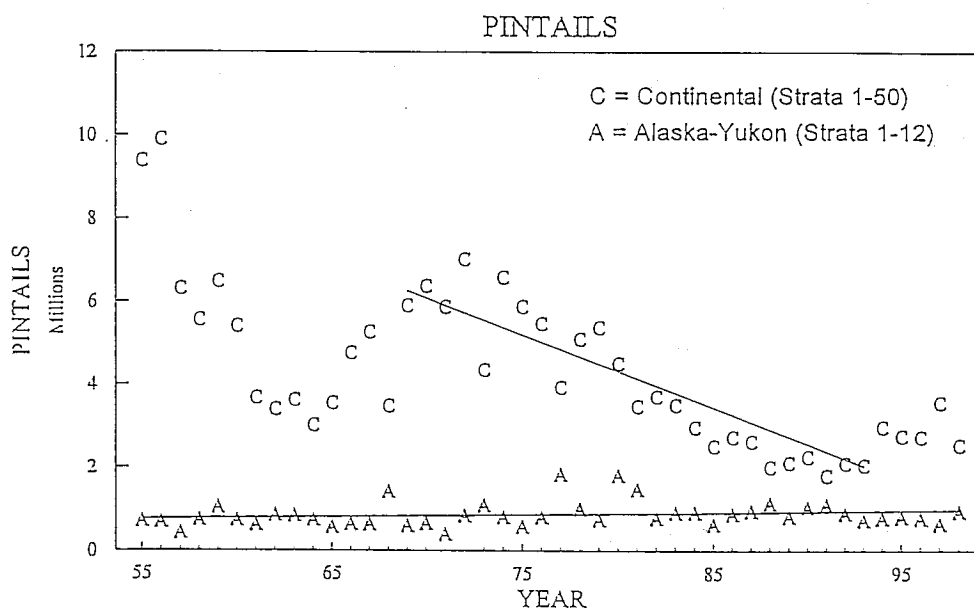
Total duck populations increased from last year and are well above both the 10-year average and the long-term mean.

Historical data from this survey, 1957-1994, have been analyzed and a major paper detailing the results has been published. Two lines were fitted to the duck data because of the increased visibility from the use of the turbine beaver (N-754) beginning in 1977. Because of the need to partition all of the historical duck data into two parts (1957-1976/1977-present), the comparisons to just long-term averages presented above may be misleading.

The generally early arrival of spring in the interior will enhance production. A more normal spring break-up on the western tundra should result in only average production there. Overall, an above average rate of duck production can be expected this year from a major portion of Alaska and the northern Yukon Territory. The results of similar surveys on the North Slope of Alaska will be reported separately.

Intensive waterfowl breeding population surveys have been conducted over all the major tundra habitat in Alaska during the last 10 years. A detailed comparison of the results of these expanded surveys over the years with this historical survey is underway for all of our tundra strata. The comprehensive duck production surveys conducted in recent years in Alaska remain on hold. A detailed analysis and summary report of those surveys are in progress.

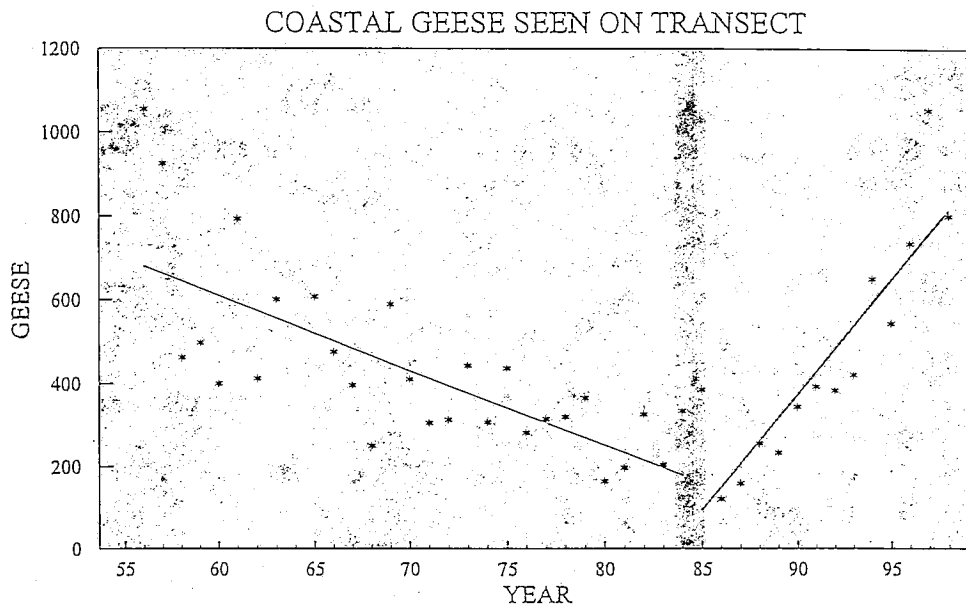
The pintail has been Alaska's most numerous nesting dabbler (recently surpassed by wigeon) and in recent years a significant proportion of Pacific Flyway pintails have been raised in Alaska. The following graph depicts pintail populations measured in Alaska-Yukon (minus the North Slope) in relation to continental (strata 1-50) populations since 1955. Fitted lines show a dramatic decline in continental populations since 1969 ($p < .01$) and a slight increase in Alaska populations ($p = .07$) over the history of the survey. This year Alaska hosted 38% of the continental index. The recent, slight increase in the continental pintail index is encouraging.



This survey was designed for ducks but other species (geese, swans, cranes, loons) are recorded routinely and an impression of their welfare is developed from our observations and the reports of others in the field.

- B. Geese: The following graph depicts the trend of all geese recorded on the 5 segments of the duck survey within the coastal zone of the Yukon-Kuskokwim Delta (actual geese seen on transect only). One year, 1964, was excluded because of the extreme weather conditions experienced that year (King and Conant 1983). Two lines were fit to these data (first 1957-1984, second 1985-1998). Restricted hunting regulations were first employed in 1984 and in subsequent years within the Yukon-Kuskokwim Delta Goose Management Plan. Thus data for 1985 and the years following probably reflect a response of goose populations (mostly

white-fronts and cacklers) to those restrictions. The recent, dramatic upward trend is heartening and continued surveys in the years ahead will reveal whether populations can be maintained or even increased from former levels as hunting effort increases.



Probably only an average rate of goose production can be expected this year on the western tundra.

A progress report by Migratory Birds - Anchorage on the thirteenth year of an intensive aerial survey program on the coastal goose nesting zone of the Yukon-Kuskokwim Delta will be forthcoming.

The specialized survey for Dusky Canada geese that this project had flown for 8 continuous years (1983-1990) was discontinued in 1991. The more extensive survey flown on the Copper River Delta by Migratory Birds - Anchorage since 1986 is now the breeding population survey which best monitors this nesting population. The results of that effort will be detailed elsewhere.

Little specific information on other populations of white-fronted and lesser Canada geese is available, but production should, on the whole, be above average for interior Alaska.

C. Swans:

1. Trumpeter - A census of trumpeters, after hatching, on the breeding grounds in Alaska in 1995 found 15,823 total swans. Swan observations from boreal forest strata (1-4, 6 and 7) on the duck survey in 1998 suggest a population of 13,700 adults and subadults. In Alaska, production this year should generally be above average. Another complete census of trumpeters in Alaska is planned for the year 2000.

2. Tundra - The population index from the tundra strata (8-11), not including the North Slope, is 156,900; an increase of 1% from last year and 25% above the 10-year average. The breeding index (singles and pairs) is 83,200; up 1% from 1997 and 27% above average. Overall, average production is expected from tundra swans for Alaska in 1998.

D. Cranes:

The Sandhill Crane index was 48,600 for Alaska, unchanged from 1997 but 3% above the 10-year average.

E. Loons:

1. The Red-Throated Loon index for Alaska was 7,900, down 16% from 1997 and 16% below the 10-year average.
2. The Pacific Loon index for Alaska was 51,700, up 57% from 1997 and 16% above the 10-year average.
3. The Common Loon index for Alaska was 8,300, up 28% from 1997 and 8% above the 10-year average.

CONCLUSION

Increased populations of total ducks were found in these northwestern strata in 1998. Some populations of geese and trumpeter swans were increased in size from last year. Sandhill crane and tundra swan populations remained stable.

The basically widespread, early arrival of spring in the interior and the mainly normal conditions on the western tundra should favorably affect waterfowl nesting and production in most Alaska-Yukon strata again in 1998. Extremely dry conditions in parts of the interior and the wet, cool spring on the west coast of Alaska may have a depressing effect. Overall, duck, goose and swan production should be generally above average in the interior and average on the western tundra.

A big unknown is how well the many flocked dabblers recorded throughout the survey will reproduce, especially if most of them are displaced prairie nesters.

In contrast to a basically optimistic outlook, a note of caution needs special emphasis for the declining populations of sea ducks (especially eiders, oldsquaw and scoters) and also red-throated loons.

FOOTNOTES

A Telonics, telemetry, receiver-scanner is an integral component of the special survey aircraft used. Extensive coverage of most waterfowl nesting habitats in Alaska (except the North Slope) was accomplished. We did not have any radio frequencies to monitor this year.

Two swan nests noticed on transect on the Old Crow Flats in the Yukon exhibited the typical moat around them from nest construction, a characteristic of Trumpeter Swans.

There has been a significant invasion of ringneck ducks into Alaska over recent years (1984-1998).

Table 1. Alaska-Yukon. Ten year trend in adjusted waterfowl breeding population estimates by species, 1989 - 1998 (estimates in thousands).

Species	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Ducks:										
Dabblers:										
Mallard	411.3	366.7	381.8	345.9	283.0	351.1	524.1	522.0	584.4	836.1
Black duck	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gadwall	4.9	4.6	8.8	4.4	0.7	2.3	0.7	5.2	1.3	0.3
Am. wigeon	550.5	568.2	647.7	593.3	538.0	727.8	730.1	818.7	953.6	1196.9
G.W. teal	402.3	473.8	546.7	376.0	444.7	562.7	556.3	757.9	512.3	678.9
B.W. teal	1.1	0.0	0.0	0.0	2.9	0.0	2.9	0.0	0.0	0.0
N. shoveler	294.2	395.0	362.4	365.8	448.9	499.9	464.7	481.2	497.2	852.5
Pintail	824.5	1042.2	1115.4	899.7	743.3	787.7	810.0	776.0	647.3	946.0
SUBTOTAL	2488.8	2850.5	3062.8	2585.1	2461.5	2931.5	3088.8	3361.0	3196.1	4510.7
Divers:										
Redhead	3.4	3.7	14.6	0.6	1.7	1.4	0.0	0.6	0.2	0.0
Canvasback	131.3	192.9	125.7	93.6	82.7	81.2	125.6	157.5	44.9	105.4
Scaups	793.0	898.9	1017.7	910.1	951.3	1148.6	946.2	1056.9	800.0	927.9
Ringneck	24.8	34.9	18.6	35.6	39.7	29.0	26.1	29.9	37.0	60.5
Goldeneyes	63.3	47.3	51.7	34.3	69.4	59.6	73.9	77.8	67.2	77.2
Bufflehead	54.6	31.8	40.1	32.2	29.6	38.2	38.0	49.7	40.2	46.7
SUBTOTAL	1070.4	1209.5	1268.4	1106.4	1174.4	1358.0	1209.8	1372.4	989.5	1217.7
Miscellaneous:										
Oldsquaw	95.1	114.6	108.0	86.8	107.0	98.7	110.7	87.9	68.6	90.9
Eiders	6.6	4.5	10.1	12.5	7.6	8.7	7.9	7.6	13.2	13.5
Scoters	355.9	356.4	315.4	469.8	321.5	324.1	309.8	460.8	235.6	348.4
Ruddy duck	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0
Mergansers	8.3	10.2	14.2	19.1	23.1	21.1	16.7	39.4	25.2	24.6
SUBTOTAL	466.7	486.4	447.7	588.2	459.2	452.6	445.1	596.5	342.6	477.4
TOTAL DUCKS	4025.9	4546.4	4778.9	4279.7	4095.1	4742.1	4743.7	5329.9	4528.2	6205.8

Table 2. Alaska-Yukon. Status of adjusted waterfowl breeding population estimates by species and strata, comparing 1998 with 1997 and the 1988 - 1997 average (estimates in thousands).

Species	Strata*			Total 1998	Total 1997	1988 - 1997 Average	% Change from 1997	% Change from Avg.
	1-7	8-11	12					
Ducks:								
Dabblers:								
Mallard	437.8	351.1	47.2	836.1	584.4	427.3	+43	+96
Black duck	0.0	0.0	0.0	0.0	0.0	0.0	-	-
Gadwall	0.0	0.0	0.3	0.3	1.3	3.9	-77	-92
Am. wigeon	677.8	384.9	134.2	1,196.9	953.6	665.5	+26	+80
G.W. teal	238.9	421.6	18.4	678.9	512.3	501.8	+33	+35
B.W. teal	0.0	0.0	0.0	0.0	0.0	2.0	-	-100
N. shoveler	402.8	399.1	50.6	852.5	497.2	421.3	+71	+102
Pintail	258.8	665.5	21.7	946.0	647.3	878.8	+46	+8
SUBTOTAL	2,016.1	2,222.2	272.4	4,510.7	3,196.1	2,900.7	+41	+56
Divers:								
Redhead	0.0	0.0	0.0	0.0	0.2	3.0	-100	-100
Canvasback	84.6	6.2	14.6	105.4	44.9	111.3	+135	-5
Scaups	350.7	497.6	79.6	927.9	800.0	929.2	+16	-0
Ringneck	56.3	1.6	2.6	60.5	37.0	32.6	+64	+86
Goldeneyes	43.4	11.9	21.9	77.2	67.2	63.5	+15	+22
Bufflehead	45.7	0.5	0.5	46.7	40.2	40.1	+16	+16
SUBTOTAL	580.7	517.8	119.2	1,217.7	989.5	1,179.7	+23	+3
Miscellaneous:								
Oldsquaw	6.5	75.7	8.7	90.9	68.6	98.6	+33	-8
Eiders	0.0	13.5	0.0	13.5	13.2	10.1	+2	+33
Scoters	42.0	231.2	75.2	348.4	235.6	357.2	+48	-2
Ruddy duck	0.0	0.0	0.0	0.0	0.0	0.2	-	-100
Mergansers	12.1	12.4	0.1	24.6	25.2	20.1	-2	+22
SUBTOTAL	60.6	332.8	84.0	477.4	342.6	486.3	+39	-2
TOTAL DUCKS	2,657.4	3,072.8	475.6	6,205.8	4,528.2	4,566.7	+37	+36

* 1-7 Interior Alaska Taiga; 8-11 Coastal Alaska Tundra; 12 Old Crow Flats, Yukon Territory, Canada

Table 3. Alaska. Ten year trend in tundra swan breeding population observations, 1989 - 1998 (estimates in thousands).

Stratum	Status	1989	1990	1991	1992	Y E A R 1993	1994	1995	1996	1997	1998	1988 - 1997 Average	% Change from 97	% Change from Avg
8	Singles & pairs	10.4	9.0	13.8	13.1	9.3	9.0	9.9	12.2	9.1	12.4	10.4	+36	+19
Bristol Bay	Flocks	23.6	0.6	1.6	2.5	1.0	1.1	10.3	1.5	4.0	1.5	4.7	-63	-68
	Total	34.0	9.6	15.4	15.6	10.3	10.1	20.2	13.7	13.1	13.9	15.1	+6	-8
9	Singles & pairs	38.0	43.9	44.0	43.9	38.2	49.3	46.3	50.2	59.3	58.6	44.9	-1	+31
Yukon Delta	Flocks	88.1	132.2	3.1	13.2	38.7	40.5	50.0	40.0	62.4	58.1	51.2	-7	+13
	Total	126.1	176.1	47.1	57.1	76.9	89.8	96.3	90.2	121.7	116.7	96.1	-4	+21
10	Singles & pairs	5.9	3.8	5.5	4.5	4.4	4.0	5.4	6.5	7.3	5.2	5.1	-29	+2
Seward Pen.	Flocks	3.8	3.4	9.1	0.0	0.0	0.0	0.0	0.0	0.4	3.4	1.7	+750	+100
	Total	9.7	7.2	14.6	4.5	4.4	4.0	5.4	6.5	7.7	8.6	6.7	+12	+28
11	Singles & pairs	4.1	5.9	5.7	4.9	5.1	4.8	4.1	6.1	7.0	7.0	5.0	+0	+40
Kotzebue So.	Flocks	1.9	17.6	0.4	0.8	0.0	0.0	0.3	0.0	6.1	10.7	2.7	+75	+296
	Total	6.0	23.5	6.1	5.7	5.1	4.8	4.4	6.1	13.1	17.7	7.7	+35	+130
	Singles & pairs	58.4	62.6	69.0	66.4	57.0	67.1	65.7	75.0	82.7	83.2	65.4	+1	+27
Total	Flocks	117.4	153.8	14.2	16.5	39.7	41.6	60.6	41.5	72.9	73.7	60.2	+1	+22
	Total	175.8	216.4	83.2	82.9	96.7	108.7	126.3	116.5	155.6	156.9	125.7	+1	+25

Note: There are additional tundra swans nesting in Alaska outside of these strata.
Actual swans observed are expanded for area only.

Table 4. Alaska-Yukon. Ten year trend in sandhill crane breeding population observations, 1989 - 1998 (estimates in thousands).

Stratum	1989	1990	1991	1992	1993	Y E A R		1995	1996	1997	1998	1988 - 1997	% Change	% Change
						1994	1995					Average	from 97	from Avg.
1. Kenai-Susitna	0.3	0.0	0.1	0.2	0.0	0.2	0.3	0.1	0.0	0.1	0.1	-	-	+0
2. Nelchina	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
3. Tanana-Kusko.	0.6	0.6	0.8	0.2	0.5	0.4	0.3	0.2	0.8	0.4	0.5	-50	-20	-
4. Yukon Flats	4.3	1.1	1.6	0.9	0.9	2.0	1.2	1.9	2.2	3.2	1.7	+45	+88	-
5. Innoko	0.5	0.7	0.7	1.5	1.2	0.2	0.5	0.2	0.2	1.1	0.7	+450	+57	-
6. Koyukuk	1.4	1.4	0.7	0.9	1.0	0.7	1.2	1.1	1.1	0.6	1.0	-45	-40	-
7. Copper Delta	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Subtotal - Interior	7.1	3.9	4.1	3.7	3.6	3.5	3.5	3.5	4.3	5.4	4.1	+26	+32	-
8. Bristol Bay	2.9	2.8	4.5	3.3	4.6	3.3	5.8	5.3	4.6	2.4	4.1	-48	-41	-
9. Yukon Delta	23.6	32.6	25.9	25.2	28.3	29.0	29.2	30.8	31.7	29.8	28.2	-6	+6	-
10. Seward Pen.	3.3	3.3	6.2	12.5	6.1	13.8	7.8	5.4	3.7	8.0	6.4	+116	+25	-
11. Kotzebue So.	5.6	5.6	4.7	4.7	4.1	4.2	3.5	4.2	4.5	3.0	4.5	-33	-33	-
Subtotal - Tundra	35.4	44.3	41.3	45.7	43.1	50.3	46.3	45.7	44.5	43.2	43.2	-3	+0	-
TOTAL - ALASKA	42.5	48.2	45.4	49.4	46.7	53.8	49.8	49.2	48.8	48.6	47.2	-0	+3	-
12. Old Crow Flats Yukon	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.0	0.1	-100	-100	-

Note: There are additional sandhill cranes nesting in Alaska - Yukon outside of these strata.
Actual sandhill cranes observed are expanded for area only.

Table 5. Alaska-Yukon. Ten year trend in red-throated loon breeding population observations, 1989 - 1998 (estimates in thousands).

Stratum	1989	1990	1991	1992	1993	Y E A R				1988 - 1997 Average	% Change from 97	% Change from Avg.	
						1994	1995	1996	1997				
1. Kenai-Susitna	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0	0.0	-	-
2. Nelchina	0.0	0.2	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.0	0.1	-100	-100
3. Tanana-Kusko.	0.1	0.1	0.2	0.0	0.1	0.1	0.0	0.6	0.1	0.1	0.1	+0	+0
4. Yukon Flats	0.0	0.5	0.1	0.1	0.1	1.1	0.1	0.0	0.5	0.0	0.3	-100	-100
5. Innoko	0.3	0.2	0.2	0.0	0.2	0.1	0.3	0.6	0.5	0.1	0.3	-80	-67
6. Koyukuk	0.1	0.3	0.2	0.0	0.1	0.3	0.0	0.1	0.1	0.1	0.1	+0	+0
7. Copper Delta	0.3	0.4	0.3	0.1	0.3	0.2	0.3	0.1	0.1	0.3	0.3	+200	+0
Subtotal - Interior	0.8	1.7	1.0	0.2	0.9	2.0	0.9	1.8	1.4	0.6	1.2	-57	-50
8. Bristol Bay	1.5	1.2	2.0	0.6	1.6	0.6	1.6	0.5	0.4	1.5	1.3	+275	+15
9. Yukon Delta	4.7	7.4	4.3	2.0	4.2	4.1	4.4	4.3	5.1	2.7	4.4	-47	-39
10. Seward Pen.	2.5	1.9	3.3	2.6	2.1	2.5	2.1	2.2	2.2	2.3	2.3	+5	+0
11. Kotzebue So.	0.1	0.4	0.2	0.1	0.2	0.2	0.0	0.3	0.3	0.8	0.2	+167	+300
Subtotal - Tundra	8.8	10.9	9.8	5.3	8.1	7.4	8.1	7.3	8.0	7.3	8.3	-9	-12
TOTAL - ALASKA	9.6	12.6	10.8	5.5	9.0	9.4	9.0	9.1	9.4	7.9	9.4	-16	-16
12. Old Crow Flats Yukon	0.4	0.1	0.3	0.0	0.0	0.3	0.4	0.1	0.3	0.1	0.2	-67	-50

Note: There are additional red-throated loons nesting in Alaska - Yukon outside of these strata.
Actual red-throated loons observed are expanded for area only.

Table 6. Alaska-Yukon. Ten year trend in Pacific loon breeding population observations, 1989 - 1998 (estimates in thousands).

Stratum	1989	1990	1991	1992	1993	Y E A R		1996	1997	1988 - 1997		% Change from 97	% Change from Avg.
						1994	1995			1998	Average		
1. Kenai-Susitna	0.0	0.2	0.1	0.2	0.4	0.3	0.5	0.3	0.3	0.3	0.3	+0	+0
2. Nelchina	0.2	0.2	0.4	0.6	0.1	0.9	0.4	0.2	0.4	0.1	0.4	-75	-75
3. Tanana-Kusko.	0.8	0.3	0.3	0.3	1.2	1.4	1.1	1.8	0.7	1.1	0.9	+57	+22
4. Yukon Flats	7.8	6.3	4.2	6.5	5.8	4.7	4.2	3.0	3.1	0.9	5.0	-71	-82
5. Innoko	0.1	0.2	0.1	0.5	0.2	0.5	0.6	0.4	0.2	0.2	0.3	+0	-33
6. Koyukuk	0.3	0.4	1.0	0.8	0.7	1.0	0.5	0.3	0.3	0.4	0.6	+33	-33
7. Copper Delta	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	+0	-
Subtotal - Interior	9.2	7.6	6.1	9.0	8.4	8.8	7.3	6.0	5.1	3.1	7.3	-39	-58
8. Bristol Bay	1.7	0.5	1.5	1.9	1.5	3.1	1.9	1.4	1.4	5.4	1.6	+286	+238
9. Yukon Delta	30.5	30.4	24.3	28.5	19.4	55.3	44.8	26.9	22.1	38.1	30.2	+72	+26
10. Seward Pen.	1.6	2.8	3.2	4.5	5.5	3.6	2.6	2.8	1.8	3.2	3.2	+78	+0
11. Kotzebue So.	2.3	2.3	1.6	2.3	3.5	3.1	2.8	2.6	2.6	1.9	2.4	-27	-21
Subtotal - Tundra	36.1	36.0	30.6	37.2	29.9	65.1	52.1	33.7	27.9	48.6	37.4	+74	+30
TOTAL - ALASKA	45.3	43.6	36.7	46.2	38.3	73.9	59.4	39.7	33.0	51.7	44.7	+57	+16
12. Old Crow Flats Yukon	2.7	2.6	2.7	2.1	2.8	3.8	4.6	2.0	1.6	1.3	2.7	-19	-52

Note: There are additional Pacific loons nesting in Alaska - Yukon outside of these strata.
Actual Pacific loons observed are expanded for area only.

Table 7. Alaska-Yukon. Ten year trend in common loon breeding population observations, 1989 - 1998 (estimates in thousands).

Stratum	Y E A R										1988 - 1997 Average	% Change from 97	% Change from Avg.
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998			
1. Kenai-Susitna	1.4	0.8	1.3	1.0	0.9	1.7	1.2	1.4	1.8	1.6	1.3	-11	+23
2. Nelchina	0.3	0.3	0.4	1.3	0.5	0.8	0.5	0.1	0.4	0.1	0.5	-75	-80
3. Tanana-Kusko.	0.7	1.2	1.3	1.1	1.3	0.9	1.5	1.9	0.8	1.1	1.2	+38	-8
4. Yukon Flats	0.9	1.2	0.1	1.5	2.3	0.3	0.4	0.1	0.7	0.5	0.9	-29	-44
5. Innoko	0.2	0.4	0.3	0.2	0.2	0.1	0.4	0.3	0.0	0.2	0.2	-	+0
6. Koyukuk	0.8	0.3	0.2	0.7	1.1	0.4	0.6	0.5	0.7	0.4	0.6	-43	-33
7. Copper Delta	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-	-
Subtotal - Interior	4.3	4.2	3.7	5.8	6.4	4.2	4.6	4.3	4.4	3.9	4.7	-11	-17
8. Bristol Bay	0.6	1.2	0.9	0.5	0.3	1.0	0.8	1.7	0.0	0.9	0.7	-	+29
9. Yukon Delta	2.4	1.9	1.3	2.8	1.9	1.4	2.7	2.4	2.1	3.2	2.1	+52	+52
10. Seward Pen.	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	-
11. Kotzebue So.	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.4	0.0	0.3	0.1	-	+200
Subtotal - Tundra	3.0	3.4	2.2	3.4	2.2	2.4	4.0	4.5	2.1	4.4	3.0	+110	+47
TOTAL - ALASKA	7.3	7.6	5.9	9.2	8.6	6.6	8.6	8.8	6.5	8.3	7.7	+28	+8
12. Old Crow Flats Yukon	0.0	0.1	0.4	0.2	0.0	0.3	0.5	0.3	0.3	0.3	0.2	+0	+50

Note: There are additional common loons nesting in Alaska - Yukon outside of these strata.
Actual common loons observed are expanded for area only.

Table 8. Alaska-Yukon. Stratum data sheet, 1998, strata 1 through 12.

Survey Design	S t r a t u m												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Square miles in stratum	2200	3900	9300	10800	3400	4100	400	9900	26600	3850	5350	1970	81,770
Square miles in sample	40	52	132	80	44	80	20	92	260	28	48	36	912
Linear miles in sample	160	208	528	320	176	320	80	368	1040	112	192	144	3,648
No. of transects in sample	6	10	18	12	7	10	7	11	8	4	7	3	103
No. of segments in sample	10	13	33	20	11	20	10	23	65	7	12	8	232
Expansion factor	55.000	75.000	70.455	135.000	77.273	51.250	20.000	107.609	102.308	137.500	111.458	54.722	-

Current Year Design	S t r a t u m												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Square miles in sample	40	52	132	80	44	80	20	92	260	28	48	36	912
Linear miles in sample	160	208	528	320	176	320	80	368	1040	112	192	144	3,648
No. of transects in sample	6	10	18	12	7	10	7	11	8	4	7	3	103
No. of segments in sample	10	13	33	20	11	20	10	23	65	7	12	8	232
Expansion factor	55.000	75.000	70.455	135.000	77.273	51.250	20.000	107.609	102.308	137.500	111.458	54.722	-

Note: Stratum 7 has 8 mile segments; stratum 12 has 18 mile segments.

Table 9. Relationship of total ducks to square miles of habitat and number of ponds in 1998 .

	Sq. Miles of Habitat	Number of Ponds (thousands)	Total Ducks (thousands)	Ponds per Sq. Mi.	Ducks per Sq. Mi.	Ducks per Pond
1. Kenai-Susitna	2200	17.5	64.4	8.0	29.3	3.7
2. Nelchina	3900	52.5	160.8	13.5	41.2	3.1
3. Tanana-Kusko.	9300	113.4	669.2	12.2	72.0	5.9
4. Yukon Flats	10800	109.8	1205.0	10.2	111.6	11.0
5. Innoko	3400	57.3	295.2	16.9	86.8	5.2
6. Koyukuk	4100	68.1	229.5	16.6	56.0	3.4
7. Copper Delta	400	19.0	33.3	47.5	83.3	1.8
Subtotal - Interior	34100	437.6	2657.4	12.8	77.9	6.1
8. Bristol Bay	9900	209.3	478.5	21.1	48.3	2.3
9. Yukon Delta	26600	960.1	1555.6	36.1	58.5	1.6
10. Seward Pen.	3850	94.1	368.9	24.4	95.8	3.9
11. Kotzebue So.	5350	87.8	669.8	16.4	125.2	7.6
Subtotal - Tundra	45700	1351.3	3072.8	29.6	67.2	2.3
TOTAL - ALASKA	79800	1788.9	5730.2	22.4	71.8	3.6
12. Old Crow Flats Yukon	1970	27.1	475.6	13.8	241.4	17.5

Note: Number of ponds is averaged from 1982-1984 transect counts
Totals are for surveyed areas only.

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 1

KENAI-SUSITNA

DATES: 5 / 16 / 98 THRU 5 / 16 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	31	9		80	3.57	15708
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	17	13		60	3.65	12045
GREEN-WINGED TEAL	2	1		6	8.88	2930
BLUE-WINGED TEAL					10.31	
SHOVELER	3	8	10	32	3.35	5896
PINTAIL	6	2	13	29	2.51	4003
REDHEAD a					3.11	
CANVASBACK					2.43	
SCAUP a	16	14	17	61	1.82	6106
RING-NECKED DUCK a		2		4	4.02	884
GOLDENEYE	11	7		36	3.61	7148
BUFFLEHEAD	5	1		12	1.86	1228
OLDSQUAW					1.99	
EIDER					3.58	
SCOTER	3	13		32	1.08	1901
RUDDY DUCK a					5.94	
MERGANSE	1	4	86	96	1.27	6706
SUB - TOTAL	95	74	126	448		64555
CANADA GOOSE	1		14	15	1.00	825
SWAN	1			1	1.00	55
CRANE	1			1	1.00	55

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

2200

SQUARE MILES IN THE SAMPLE (S)

40

NUMBER OF SEGMENTS

10

EXPANSION FACTOR

55.000

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 2

NELCHINA

DATES: 6 / 13 / 98 THRU 6 / 13 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)	
MALLARD	24	14	25	101	3.57	27043	27.0
BLACK DUCK					2.76		
GADWALL					3.04		
AMERICAN WIGEON	29	16	55	145	3.65	39694	39.7
GREEN-WINGED TEAL	12	4		32	8.88	21312	21.3
BLUE-WINGED TEAL					10.31		
SHOVELER	11	3		28	3.35	7035	7.0
PINTAIL	9	1		20	2.51	3765	3.8
REDHEAD a					3.11		
CANVASBACK					2.43		
SCAUP a	93	69	60	291	1.82	39722	39.7
RING-NECKED DUCK a	9	4	6	23	4.02	6935	6.9
GOLDENEYE	3	1		8	3.61	2166	2.2
BUFFLEHEAD	14	3		34	1.86	4743	4.7
OLDSQUAW	3			6	1.99	896	0.9
EIDER					3.58		
SCOTER	10	24	23	91	1.08	7371	7.4
RUDDY DUCK a					5.94		
MERGANSE	1			2	1.27	191	0.2
SUB - TOTAL	218	139	169	781		160871	160.8
CANADA GOOSE					1.00		
SWAN	10	20	16	66	1.00	4950	4.9
CRANE					1.00		

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

3900

SQUARE MILES IN THE SAMPLE (S)

52

NUMBER OF SEGMENTS

13

EXPANSION FACTOR

75.000

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 3

TANANA-KUSKOKWIM

DATES: 5 / 18 / 98 THRU 5 / 26 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)	
MALLARD	99	88	34	408	3.57	102621	102.6
BLACK DUCK					2.76		
GADWALL					3.04		
AMERICAN WIGEON	83	172	46	556	3.65	142980	143.0
GREEN-WINGED TEAL	27	30	8	122	8.88	76328	76.3
BLUE-WINGED TEAL					10.31		
SHOVELER	42	89	73	335	3.35	79068	79.1
PINTAIL	67	74	41	323	2.51	57120	57.1
REDHEAD a					3.11		
CANVASBACK	6	17	28	74	2.43	12669	12.7
SCAUP a	63	219	374	875	1.82	112199	112.2
RING-NECKED DUCK a	21	37	8	103	4.02	29172	29.2
GOLDENEYE	19	15		68	3.61	17295	17.3
BUFFLEHEAD	27	39	9	141	1.86	18477	18.5
OLDSQUAW	1	9	6	26	1.99	3645	3.6
EIDER					3.58		
SCOTER	19	50	67	205	1.08	15599	15.6
RUDDY DUCK a					5.94		
MERGANSE	9	2		22	1.27	1969	2.0
SUB - TOTAL	483	841	694	3258		669142	669.2
CANADA GOOSE		1		2	1.00	141	0.1
SWAN	21	33	10	97	1.00	6834	6.8
CRANE	2	2		6	1.00	423	0.4

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

9300

SQUARE MILES IN THE SAMPLE (S)

132

NUMBER OF SEGMENTS

33

EXPANSION FACTOR

70.455

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 4

YUKON FLATS

DATES: 5 / 21 / 98 THRU 5 / 21 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)	
MALLARD	83	65	95	391	3.57	188442	188.4
BLACK DUCK					2.76		
GADWALL					3.04		
AMERICAN WIGEON	94	208	88	692	3.65	340983	341.0
GREEN-WINGED TEAL	12	13		50	8.88	59940	59.9
BLUE-WINGED TEAL					10.31		
SHOVELER	70	130	106	506	3.35	228839	228.8
PINTAIL	64	54	96	332	2.51	112498	112.5
REDHEAD a					3.11		
CANVASBACK	13	37	113	213	2.43	69875	69.9
SCAUP a	70	142	279	633	1.82	155528	155.5
RING-NECKED DUCK a	6	7		20	4.02	10854	10.9
GOLDENEYE	4	5		18	3.61	8772	8.8
BUFFLEHEAD	15	19		68	1.86	17075	17.1
OLDSQUAW		2		4	1.99	1075	1.1
EIDER					3.58		
SCOTER	1	19	29	69	1.08	10060	10.1
RUDDY DUCK a					5.94		
MERGANSE	3			6	1.27	1029	1.0
SUB - TOTAL	435	701	806	3002		1204970	1205.0
CANADA GOOSE	7	7	6	27	1.00	3645	3.6
SWAN					1.00		
CRANE	6	4	10	24	1.00	3240	3.2

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

10800

SQUARE MILES IN THE SAMPLE (S)

80

NUMBER OF SEGMENTS

20

EXPANSION FACTOR

135.000

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 5

INNOKO

DATES: 5 / 26 / 98 THRU 5 / 26 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)	
MALLARD	46	19	40	170	3.57	46897	46.9
BLACK DUCK					2.76		
GADWALL					3.04		
AMERICAN WIGEON	55	51	50	262	3.65	73896	73.9
GREEN-WINGED TEAL	18	16		68	8.88	46660	46.7
BLUE-WINGED TEAL					10.31		
SHOVELER	33	42	31	181	3.35	46854	46.9
PINTAIL	70	22	100	284	2.51	55083	55.1
REDHEAD a					3.11		
CANVASBACK	2			4	2.43	751	0.8
SCAUP a	20	32	6	90	1.82	12657	12.7
RING-NECKED DUCK a	2		4	6	4.02	1864	1.9
GOLDENEYE	3	6		18	3.61	5021	5.0
BUFFLEHEAD	1	3		8	1.86	1150	1.1
OLDSQUAW		1		2	1.99	308	0.3
EIDER					3.58		
SCOTER	5	7	6	30	1.08	2504	2.5
RUDDY DUCK a					5.94		
MERGANSE	6	1		14	1.27	1374	1.4
SUB - TOTAL	261	200	237	1137		295019	295.2
CANADA GOOSE	7	9		25	1.00	1932	1.9
SWAN	4	4		12	1.00	927	0.9
CRANE		3	8	14	1.00	1082	1.1

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

3400

SQUARE MILES IN THE SAMPLE (S)

44

NUMBER OF SEGMENTS

11

EXPANSION FACTOR

77.273

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 6

KOYUKUK

DATES: 5 / 22 / 98 THRU 5 / 22 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)	
MALLARD	59	43	21	225	3.57	41167	41.2
BLACK DUCK					2.76		
GADWALL					3.04		
AMERICAN WIGEON	55	97	36	340	3.65	63601	63.6
GREEN-WINGED TEAL	14	19		66	8.88	30037	30.0
BLUE-WINGED TEAL					10.31		
SHOVELER	28	58	18	190	3.35	32621	32.6
PINTAIL	64	31	10	200	2.51	25728	25.7
REDHEAD a					3.11		
CANVASBACK		1		2	2.43	249	0.2
SCAUP a	39	75	26	215	1.82	20054	20.1
RING-NECKED DUCK a	9	7		23	4.02	4739	4.7
GOLDENEYE	1	7		16	3.61	2960	3.0
BUFFLEHEAD	8	5	5	31	1.86	2955	3.0
OLDSQUAW		3		6	1.99	612	0.6
EIDER					3.58		
SCOTER	10	15	32	82	1.08	4539	4.5
RUDDY DUCK a					5.94		
MERGANSE	2			4	1.27	260	0.3
SUB - TOTAL	289	361	148	1400		229521	229.5
CANADA GOOSE	6	4		14	1.00	718	0.7
SWAN	8	5		18	1.00	923	0.9
CRANE	7	1	3	12	1.00	615	0.6

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

4100

SQUARE MILES IN THE SAMPLE (S)

80

NUMBER OF SEGMENTS

20

EXPANSION FACTOR

51.250

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 7

COPPER DELTA

DATES: 5 / 16 / 98 THRU 5 / 16 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	71	35	12	224	3.57	15994
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	16	8	15	63	3.65	4599
GREEN-WINGED TEAL	2	3		10	8.88	1776
BLUE-WINGED TEAL					10.31	
SHOVELER	9	8	4	38	3.35	2546
PINTAIL	3	3		12	2.51	602
REDHEAD a					3.11	
CANVASBACK			20	20	2.43	972
SCAUP a	6	10	96	122	1.82	4441
RING-NECKED DUCK a	7	8		23	4.02	1849
GOLDENEYE					3.61	
BUFFLEHEAD		1		2	1.86	74
OLDSQUAW					1.99	
EIDER					3.58	
SCOTER		1		2	1.08	43
RUDDY DUCK a					5.94	
MERGANSE	1	3	12	20	1.27	508
SUB - TOTAL	115	80	159	536		33405
CANADA GOOSE	37	65	59	226	1.00	4520
SWAN	9	19	4	51	1.00	1020
CRANE					1.00	

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

400

SQUARE MILES IN THE SAMPLE (S)

20

NUMBER OF SEGMENTS

10

EXPANSION FACTOR

20.000

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 8

BRISTOL BAY

DATES: 5 / 26 / 98 THRU 5 / 28 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	58	22		160	4.01	69042 69.0
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	26	28	5	113	3.84	46694 46.7
GREEN-WINGED TEAL	21	13		68	8.36	61173 61.2
BLUE-WINGED TEAL					10.31	
SHOVELER	16	11		54	3.79	22023 22.0
PINTAIL	58	29	7	181	3.05	59405 59.4
REDHEAD a					3.11	
CANVASBACK					2.43	
SCAUP a	79	153	235	620	1.93	128765 128.8
RING-NECKED DUCK a					4.02	
GOLDENEYE	1			2	3.61	777 0.8
BUFFLEHEAD					1.86	
OLDSQUAW	6	12		36	1.87	7244 7.2
EIDER		1		2	3.58	770 0.8
SCOTER	39	155	211	599	1.17	75415 75.4
RUDDY DUCK a					5.94	
MERGANSE	5	13	17	53	1.27	7243 7.2
SUB - TOTAL	309	437	475	1888		478552 478.5
CANADA GOOSE	5		4	9	1.00	968 1.0
SWAN	47	34	14	129	1.00	13882 13.9
CRANE	9	5	3	22	1.00	2367 2.4

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

9900

SQUARE MILES IN THE SAMPLE (S)

92

NUMBER OF SEGMENTS

23

EXPANSION FACTOR

107.609

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 9

YUKON DELTA

DATES: 5 / 29 / 98 THRU 6 / 3 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	154	35	5	383	4.01	157127
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	94	86	20	380	3.84	149287
GREEN-WINGED TEAL	116	38		308	8.36	263430
BLUE-WINGED TEAL					10.31	
SHOVELER	143	91		468	3.79	181465
PINTAIL	415	145	41	1161	3.05	362277
REDHEAD a					3.11	
CANVASBACK	7	1		16	2.43	3978
SCAUP a	162	443	242	1290	1.93	254715
RING-NECKED DUCK a	2	1		4	4.02	1645
GOLDENEYE	7	7		28	3.61	10341
BUFFLEHEAD					1.86	
OLDSQUAW	51	60		222	1.87	42472
EIDER	8	4		24	3.58	8790
SCOTER	101	278	215	973	1.17	116468
RUDDY DUCK a					5.94	
MERGANSE	9	5		28	1.27	3638
SUB - TOTAL	1269	1194	523	5285		1555635
CANADA GOOSE	113	154	112	533	1.00	54530
SWAN	279	147	568	1141	1.00	116733
CRANE	144	52	43	291	1.00	29772

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

26600

SQUARE MILES IN THE SAMPLE (S)

260

NUMBER OF SEGMENTS

65

EXPANSION FACTOR

102.308

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 10

SEWARD PENINSULA

DATES: 6 / 10 / 98 THRU 6 / 10 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	18	11		58	4.01	31980
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	13	9	34	78	3.84	41184
GREEN-WINGED TEAL	10	3		26	8.36	29887
BLUE-WINGED TEAL					10.31	
SHOVELER	31	20		102	3.79	53155
PINTAIL	98	42	33	313	3.05	131264
REDHEAD a					3.11	
CANVASBACK					2.43	
SCAUP a	22	43	18	126	1.93	33437
RING-NECKED DUCK a					4.02	
GOLDENEYE					3.61	
BUFFLEHEAD		1		2	1.86	512
OLDSQUAW	15	17	5	69	1.87	17742
EIDER		4		8	3.58	3938
SCOTER	16	38	46	154	1.17	24775
RUDDY DUCK a					5.94	
MERGANSE	2	1		6	1.27	1048
SUB - TOTAL	225	189	136	942		368921
CANADA GOOSE	10	3	15	31	1.00	4263
SWAN	18	10	25	63	1.00	8663
CRANE	9	8	33	58	1.00	7975

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

3850

SQUARE MILES IN THE SAMPLE (S)

28

NUMBER OF SEGMENTS

7

EXPANSION FACTOR

137.500

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 11

KOTZEBUE SOUND

DATES: 6 / 11 / 98 THRU 6 / 11 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	69	24	22	208	4.01	92965
BLACK DUCK					2.76	
GADWALL					3.04	
AMERICAN WIGEON	93	48	63	345	3.84	147660
GREEN-WINGED TEAL	29	7		72	8.36	67089
BLUE-WINGED TEAL					10.31	
SHOVELER	94	30	89	337	3.79	142358
PINTAIL	76	33	113	331	3.05	112523
REDHEAD a					3.11	
CANVASBACK		4		8	2.43	2167
SCAUP a	80	122	51	375	1.93	80668
RING-NECKED DUCK a					4.02	
GOLDENEYE		1		2	3.61	805
BUFFLEHEAD					1.86	
OLDSQUAW	10	10		40	1.87	8337
EIDER					3.58	
SCOTER	9	35	23	111	1.17	14475
RUDDY DUCK a					5.94	
MERGANSE		2		4	1.27	566
SUB - TOTAL	460	316	361	1833		669613
CANADA GOOSE	19	23	32	97	1.00	10811
SWAN	27	18	96	159	1.00	17722
CRANE	12	4	7	27	1.00	3009

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

5350

SQUARE MILES IN THE SAMPLE (S)

48

NUMBER OF SEGMENTS

12

EXPANSION FACTOR

111.458

a Drakes not doubled in arriving at indicated total birds (T).

WATERFOWL BREEDING POPULATION SURVEY

STRATUM: 12

OLD CROW FLATS

DATES: 6 / 12 / 98 THRU 6 / 12 / 98

SPECIES	DRAKES	PAIRS	GROUPED BIRDS	INDICATED TOTAL BIRDS (T)	VISIBILITY RATIO (V)	POPULATION INDEX (P)
MALLARD	61	38	117	315	2.74	47231 47.2
BLACK DUCK					2.76	
GADWALL		1		2	3.04	333 0.3
AMERICAN WIGEON	81	50	133	395	6.21	134231 134.2
GREEN-WINGED TEAL	12	7	5	43	7.84	18448 18.4
BLUE-WINGED TEAL					10.31	
SHOVELER	32	17	167	265	3.49	50610 50.6
PINTAIL	15	3	113	149	2.66	21689 21.7
REDHEAD a					3.11	
CANVASBACK	7	3	83	103	2.59	14598 14.6
SCAUP a	139	108	280	635	2.29	79574 79.6
RING-NECKED DUCK a	6	3		12	4.02	2640 2.6
GOLDENEYE	21	4	61	111	3.61	21928 21.9
BUFFLEHEAD	1	1		4	2.21	484 0.5
OLDSQUAW	21	19		80	1.99	8712 8.7
EIDER					3.58	
SCOTER	82	222	353	961	1.43	75201 75.2
RUDDY DUCK a					5.94	
MERGANSE	1			2	1.27	139 0.1
SUB - TOTAL	479	476	1312	3077		475816 475.6
CANADA GOOSE	1			1	1.00	55 0.1
SWAN	4		3	7	1.00	383 0.4
CRANE					1.00	

COMPUTATION OF THE POPULATION INDEX

P = POPULATION INDEX

A = SQUARE MILES IN THE STRATUM

T = INDICATED TOTAL BIRDS

S = SQUARE MILES IN THE SAMPLE

V = VISIBILITY RATIO

 $P = A * (T/S) * V$

NUMBER OF OBSERVED PONDS (x2)

0

POND INDEX

0

SQUARE MILES IN THE STRATUM (A)

1970

SQUARE MILES IN THE SAMPLE (S)

36

NUMBER OF SEGMENTS

8

EXPANSION FACTOR

54.722

a Drakes not doubled in arriving at indicated total birds (T).