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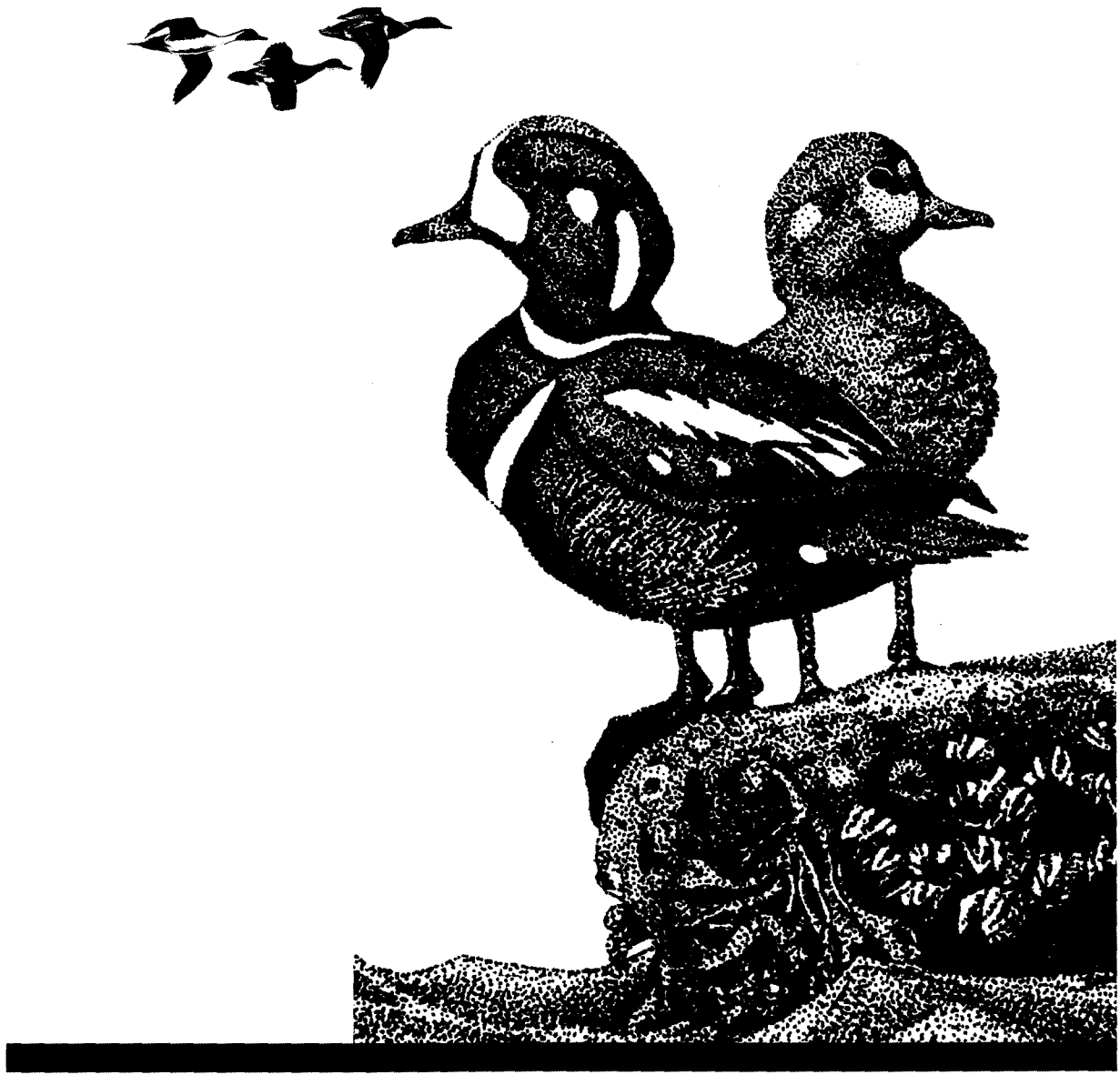
Ground Brood Counts to Estimate Waterfowl Populations in BLM's Kobuk District, Alaska: 1992 Progress Report

R. J. Brown, A. E. Morkill, and R. R. Jandt



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Abstract

Abstract: Between July 21 and July 28, 1992, the Kobuk District of the Bureau of Land Management (BLM) conducted waterfowl brood surveys in two production areas on the Seward Peninsula in Alaska. McCarthys Marsh, in the Fish River Flats, was surveyed for the fourth consecutive year. Wetlands along the upper Kuzitrin River were surveyed for the second consecutive year. A stratified random sampling technique was used to select survey plots. Thirty 2.6 km^2 plots were surveyed, 15 in McCarthys Marsh and 15 in the Kuzitrin River. Estimated production in McCarthys Marsh was 4691 ± 516 young ducks, or 11.72 young/km^2. Estimated production in the Kuzitrin River wetlands was 3992 ± 559 young ducks, or 8.44 young/km^2.

INTRODUCTION

Alaska's wetlands have gained importance for migratory waterfowl and other birds as wetlands elsewhere in North America are increasingly impacted by an expanding human presence and persistent drought conditions. BLM-Kobuk District has conducted a multi-year waterfowl brood survey in the Seward Peninsula Key Waterfowl Habitat Management Area, Alaska (BLM 1989), to gain an understanding of waterfowl production, species composition, habitat use, and habitat quality. Baseline data will enable land managers to make informed decisions regarding appropriate land use balanced with resource conservation on public lands.

Annual brood inventories were initiated on McCarthys Marsh in 1989 (Anderson and Robinson 1991a), and the Kuzitrin River basin was added to the survey effort in 1991 (Figure 1). The U. S. Fish and Wildlife Service (USFWS) has conducted brood inventories on selected wetlands elsewhere in Alaska for many years. Our data were compatible with USFWS's for incorporating into their annual assessment of statewide waterfowl populations.

Participants in the 1992 fieldwork included R. Brown, H. Brownell, R. Jandt, and A. Morkill, BLM-Kobuk District; C. Wilson, BLM-Alaska State Office; D. Angelo and L. Jeanes, BLM Volunteers; W. Gregg and H. Huntington, BLM Resource Apprenticeship Program for Students (RAPS); and A. Farris and K. Roush, NPS-Bering Land Bridge National Preserve. Transportation to and from the plots was provided by K. Sweetsir (Wright's Air, Fairbanks) and T. Rollie (Trans-Alaska Helicopters, Anchorage). This report is the third in a series of progress reports published as BLM-Alaska Open File Reports (see Anderson and Robinson 1991b, Brown and Jandt 1992).

STUDY AREAS

McCarthys Marsh is located in the Fish River Flats, which cover about 520 km^2 on the southcentral Seward Peninsula. The area is bounded by the Bendeleben Mountains to the north and Darby Mountains to the east and southeast. Numerous streams flow from the surrounding mountains into the Fish River, which drains the wetlands, emptying into Golovnin Bay on Norton Sound. McCarthys Marsh ranges in elevation from 15 to 90 m above sea level. The McCarthys Marsh study area also includes Death Valley, a 182 km^2 area east of the Darby Mountains. Death

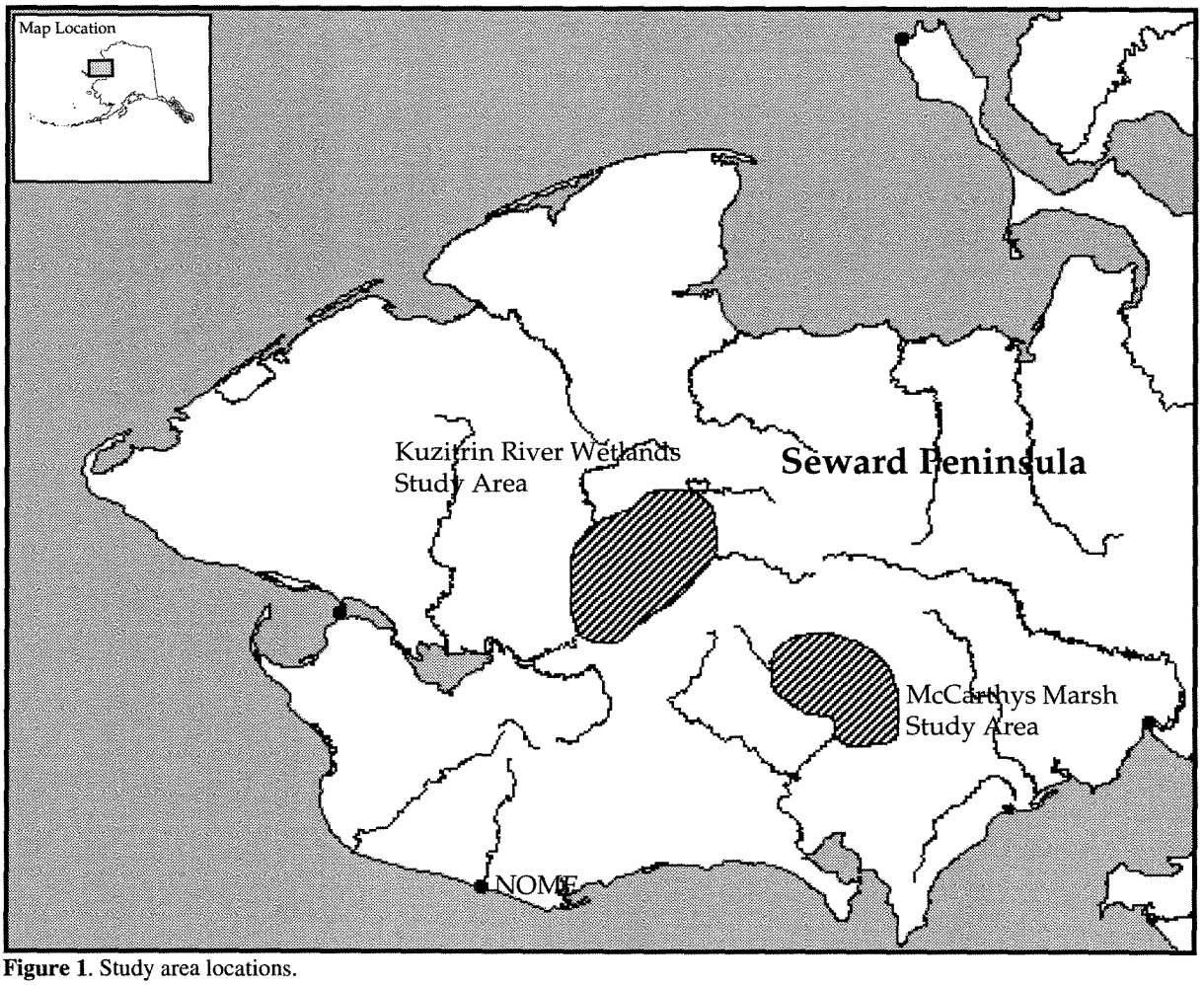

Figure 1. Study area locations.

Valley is drained by the Tubutulik River and averages 160 m in elevation.

The Kuzitrin River study area covers 835 km^2 and lies in the west-central part of the Peninsula. The Kuzitrin, Noxapaga and Kougarok rivers flow into the wetland complex that is bounded by Lava Lake to the northeast, the Bendeleben Mountains to the south and Bunker Hill to the southwest. The area is drained by the Kuzitrin River, which flows west to Imuruk Basin. Elevations range from 15 to 90 m. Approximately 30% of the study area in the northeastern section lies within the Bering Land Bridge National Preserve.

Plant communities and wetland characteristics in the study areas have been described (Anderson and Robinson 1991a, 1991b; Brown and Jandt 1992). Treeless tundra dominates in both study areas, with patches of various shrub communities. Wetland plant distribution and composition varied among lakes; while some lakes lacked both emergent and submergent vegetation, others had emergent vegetation around their margins and submergent vegetation throughout the shallow areas.

METHODS

Both McCarthys Marsh and the Kuzitrin River study areas were divided into 2.6 km^2 (one square mile) plots on U.S. Geological Survey 1:63,360 scale topographic maps. Each plot was stratified as either "other" (i.e. good), "poor," or "no" habitat based on water surface area and stream flow apparent on topographic maps (Anderson and Robinson 1991a). Fifteen plots, representing 10 "other" stratum and 5 "poor" stratum, were randomly selected in each study area for the waterfowl brood survey.

Survey methods closely followed the USFWS's (1991) standard operating procedures. A floatplane and helicopter provided access to individual plots. Teams of two observers walked or canoed around ponds and lakes, using binoculars and spotting scopes to observe waterfowl. Priority was given to identifying, quantifying and aging waterfowl broods, but all observed waterbirds were recorded. Note in the results that both diving ducks (tribe: *Aythini*) and sea ducks (tribe: *Mergini*) are referred to as divers.

Waterfowl brood data were subsequently entered into the Alaska Duck Production Survey Data Analysis Software, a LOTUS™ program provided by USFWS's Migratory Bird Management Office to assist in interpretation and statistical analysis (Hodges and Witmer 1990). Results include production estimates with their associated coefficient of variation (CV) that are corrected given a sampling fraction correction factor (Brown and Jandt 1992). The corrected CVs approached the desired level of variation of 15% (USFWS 1991).

On selected water bodies, limnologic characteristics of water surface temperature, depth, transparency, and pH were measured.

RESULTS

Waterfowl Production and Species Composition

McCarthys Marsh

McCarthys Marsh contained approximately 400 km^2 of wetland habitat, with 150 km^2 in the "other" stratum and 250 km^2 in the "poor" stratum. Eight observers surveyed 10 "other" and 5 "poor" plots in four days. Observers recorded 249 adult ducks and 562 young in 147 broods, 15 adult and 9 young Canada geese (*Branta canadensis*), 19 adult and 1 young tundra swans (*Cygnus columbianus*), 28 adult and 8 young red-necked grebes (*Podiceps grisegena*), 1 horned grebe (*P. auritus*), 20 adult and 2 young Pacific loons (*Gavia pacifica*), 4 red-throated loons (*G. stellata*), and 7 sandhill cranes (*Grus canadensis*).

Mallard (*Anas platyrhynchos*), American wigeon (*A. americana*), green-winged teal (*A. crecca*), Northern shoveler (*A. clypeata*), and Northern pintail (*A. acuta*) were the dabbling ducks observed in McCarthys Marsh. Divers included greater scaup (*Aythya marila*), Barrow's goldeneye (*Bucephala islandica*), oldsquaw (*Clangula hyemalis*), and black scoter (*Melanitta nigra*) (Table 1).

Pintail and American wigeon broods were the most common waterfowl species observed, constituting 34% and 31% of the total, respectively. Green-winged teal broods made up 14 %, and all other brood species combined made up 21% of observed broods (Figure 2). Diver broods comprised less than 10% of the total. Average brood size across all age classes (considering only broods of known size) was 4.3 ± 2.0 for pintails (n=32), and 4.7 ± 1.7 for American wigeon (n=30). These figures were similar to USFWS data from 1984-1989 in Alaska, where pintail broods averaged 4.34 young and American wigeon broods averaged 4.87 young (Hodges and Witmer 1990).

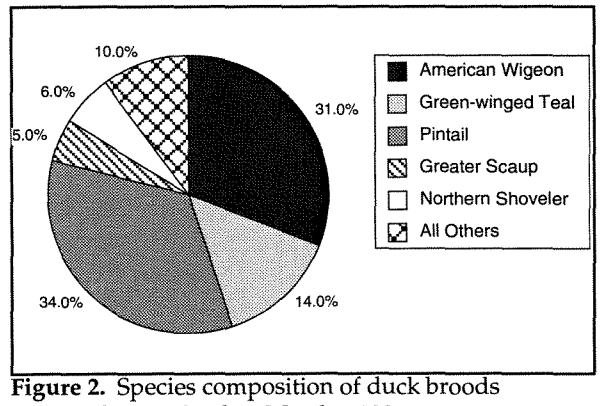

Figure 2. Species composition of duck broods observed in McCarthys Marsh, 1992.

Table 1. Number of broods, young and adult ducks observed on 15 survey plots in McCarthys Marsh, 1992.

Species	Number of Broods	Percent of Total	Number of Young	Percent of Total	Number of Adults	Percent of Total
Mallard	4	3	11	2	17	7
American Wigeon	46	31	192	34	56	22
Green-Winged Teal	21	14	68	12	31	12
Northern Shoveler	9	6	33	6	15	6
Northern Pintail	50	34	188	34	77	31
Greater Scaup	8	5	51	9	21	8
Barrow's Goldeneye	0	0	0	0	7	3
Oldsquaw	5	3	12	2	12	5
Black Scoter	2	1	7	1	9	4
Unidentified Ducks	2	1	0	0	4	2
	147	100	562	100	249	100

The expanded estimate of duck broods in McCarthys Marsh was 1074 ± 107 broods, given a corrected CV of 10%. This is equivalent to 2.68 broods/km^2. The estimated production of young ducks in McCarthys Marsh was 4691 ± 516 young, given a corrected CV of 11%. This is equivalent to 11.72 young ducks produced/km^2. Habitat in the "other" stratum contributed 73% to the overall production estimate.

Interestingly, 43% of total observed dabbler broods (31% of total observed broods) were accounted for on a single "other" plot (O-7). Two diver broods and 38 dabbler broods totaling 262 young were recorded. These included two pintail gang broods totaling 50 young and three green-winged teal gang broods totaling 59 young.

Kuzitrin River

The Kuzitrin River study area contained roughly 475 km^2 of wetland habitat, with 130 km^2 in the "other" stratum and 345 km^2 in the "poor "stratum. Ten observers surveyed 10 "other" and 5 "poor" plots in three days. Observers recorded 961 adult ducks with 436 young in 99 broods, 55 adult and 16 young greater white-fronted geese (*Anser albifrons*), 142 adult and 26 young Canada geese, 16 adult and 5 young tundra swans, 44 adult and 6 young red-necked grebes, 1 horned grebe, 2 yellow-billed loons (*Gavia adamsii*), 25 adult and 2 young Pacific loons, 4 red-throated loons, and 4 sandhill cranes.

Mallard, American wigeon, green-winged teal, Northern shoveler, and pintail were the dabbling duck species observed in the Kuzitrin River study area. Divers included greater scaup, oldsquaw, black scoter, white-winged scoter (*Melanitta fusca*), and surf scoter (*M. perspicillata*) (Table 2).

American wigeon and pintail broods were the most common species observed, constituting 20% and 19% of the total, respectively. Greater scaup broods followed in abundance with 17% of observed broods (Figure 3). Average brood size across age classes (considering only observed broods of known size) was 3.7 ± 2.0 for pintail

Table 2. Number of broods, young and adult ducks on 15 survey plots in the Kuzitrin River wetlands, 1992

Species	Number of Broods	Percent of Total	Number of Young	Percent of Total	Number of Adults	Percent of Total
Mallard	2	2	13	3	15	2
American Wigeon	20	20	87	20	297	31
Green-Winged Teal	13	13	51	12	22	2
Northern Shoveler	6	6	12	3	12	1
Northern Pintail	19	19	55	13	120	12
Greater Scaup	17	17	105	24	334	35
Oldsquaw	10	10	42	10	49	5
Black Scoter	5	5	31	7	77	8
White-Winged Scoter	0	0	0	0	5	<1
Surf Scoter	4	4	24	6	14	1
Unidentified Ducks	3	3	16	4	16	2
Total	99	100	436	100	961	100

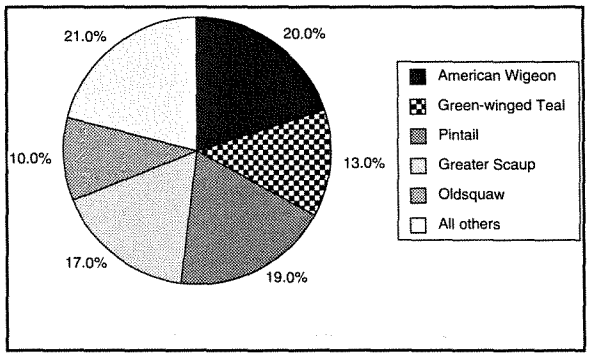

Figure 3. Species composition of duck broods observed in the Kuzitrin River wetlands, 1992

(n=15), 4.5 ± 2.3 for American wigeon (n=15), and 6.1 ± 2.3 for greater scaup (n=15). These values were again similar to USFWS's averages of 4.34 for pintail, 4.87 for American wigeon, and 6.22 for greater scaup (Hodges and Witmer 1990).

The expanded estimate of duck broods in the Kuzitrin River study area was 883 ± 141 broods, given a corrected CV of 16 %. This is equivalent to 1.87 broods/km^2. The estimated production of young ducks in the Kuzitrin River wetlands was 3992 ± 559 young, given a corrected CV of 14%. This is equivalent to 8.45 young ducks produced/ km^2. Habitat in the "other" stratum contributed 49 % of the overall production estimate.

Limnology

Seven ponds in the Kuzitrin River study area and 5 ponds in McCarthys Marsh were selected for measurement of limnologic characteristics (Table 3). The pH levels ranged 6.9 - 8.8, with an average of 7.5. Surface temperatures ranged 16 - 18^0 C. Pond depth varied between 0.5 and 2.5 m. Transparency ranged 0.70 -1.75 m.

DISCUSSION

In 1992, waterfowl production declined slightly in McCarthys Marsh compared to 1991 when 3.01 broods/km^2 and 13.7 young ducks/km^2 were produced, but remained higher than that reported for the previous survey years (Figure 4). In the Kuzitrin River basin, waterfowl production also declined from 1991 when 3.32 broods/km^2 and 13.98 young ducks/km^2 were produced (Figure 5). Further analysis comparing waterfowl production between years in McCarthys Marsh and Kuzitrin River production areas will be conducted for a final report.

Nesting chronology and success are determined by a variety of factors at the nesting site, including weather, water levels, and predation; as well as conditions along the migration route and wintering grounds. Spring breakup came late to Alaska in 1992, and we speculated that nesting efforts were subsequently delayed due to persistent snow cover and frozen wetlands, and below-normal temperatures. We thus expected to see a shift in the average age of duck broods from older to younger age classes compared to 1991, when spring conditions were considered normal. In the Kuzitrin River, dabbler broods included 60% (n=32) Class II and 32% (n=17) Class I ducklings in 1992. In contrast, 56% (n=44) of broods were Class III and 38% (n=30) were Class II ducklings in 1991 (Figure 6a). Diver broods were similar between years, with more Class I ducklings than Class II or III (Figure 6b).

In McCarthys Marsh in 1992, dabbler broods was fairly evenly distributed among age classes; whereas in previous years, class II and III broods were more commonly observed (Figure 7a). Diver broods observed in 1992 were generally younger than in 1990 and 1991 (Figure 7b). Age distribution of broods observed in 1992 indicated that our survey timing was still adequate for dabblers, but perhaps early to detect diver broods, many of which may not yet have hatched. Differences in brood age between dabblers and divers was as expected as dabblers tend to initiate nesting earlier in spring than divers (Bellrose 1980).

Waterfowl production varied between plots, and observations indicated that some individual plots were highly productive. As previously noted, plot O-7 in McCarthys Marsh was apparently the most productive plot surveyed in 1992. Similar results were found in previous years when 22% and 24% of the total observed broods were recorded in this plot in 1989 and 1991, respectively (the plot was not surveyed in 1990) (Anderson and Robinson 1991a, Brown and Jandt 1992). Habitat characteristics may have contributed to the plot's high productivity of waterfowl in general and dabblers in particular. Plot O-7 encompassed a section consisting of many wetlands and sloughs interconnected by streamflow. Tall grass and shrubs around the wetland margins provided escapement and shelter cover. Emergent vegetation covered a large percentage of water surface area, which provided a food source as well as a substrate for aquatic invertebrates. In contrast, many other plots were characterized by little or no streamflow, low tundra around wetland margins, and isolated water bodies that reached maximum depth (1-2 m) close to shore with little or no emergent vegetation.

Given several years of waterfowl production data, further study is warranted to measure specific habitat characteristics on plots to determine if there is a correlation between certain habitat features and density of broods on the Seward Peninsula.

Table 3. Limnologic variables from selected water bodies in McCarthys Marsh and Kuzitrin River wetlands, 1992.

StudyArea/Plot/Pond	pH	Surface Temp °C	Maximum Depth (m)	Transparency Depth (m)	Open/Closed System
McCarthy/0-10/4	7.2	18	1.2	1.10	closed
McCarthy/0-7/10	7.4	18	1.2	1.20	open
McCarthy/0-9/5	7.3	18	0.90	0.90	open
McCarthy/0-8/1	7.3	18	0.70	0.70	closed
McCarthy/0-11/1	7.4	18	1.00	1.00	open
Kuzitrin/0-8/1	7.3	18	0.75	0.75	closed
Kuzitrin/0-1/2	7.8	16	<1.00	<1.00	closed
Kuzitrin/0-2/4	6.9	17	1.75	1.75	open
Kuzitrin/0-3/1	8.8	18	1.50	1.50	closed
Kuzitrin/0-6/1	8.1	18	1.50	1.50	closed
Kuzitrin/P-4/5	7.0	17	2.25	1.25	closed
Kuzitrin/0-10/1	7.2	18	2.50	1.25	closed

In addition to varying numbers of duck broods observed between plots, large flocks of non-breeding, failed and post-breeding adult ducks were observed in three plots in the Kuzitrin River production area, representing 66% (n=633) of the total number of adults observed (N=961) in 1992. Known species included greater scaup, American wigeon, and pintail. Most of the adult pintails were drakes in eclipse plumage. Similarly, 32% (n=257) of the total number of adults observed (N=815) in 1991 were accounted for on one of these same plots. Such concentrations were not noted on surveyed plots in McCarthys Marsh. Pintail and American wigeon drakes desert the females early in incubation and flock with other post-breeding males. By early July, large flocks of molting drakes, non-breeders, and females whose nests failed occur commonly on many Seward Peninsula wetlands (Kessel 1989). Greater scaup drakes also molt in July and remain flightless until mid-August (Bellrose 1980). Flightless waterfowl select open water areas that provide abundant food and safety from predators.

The Kuzitrin River production area is apparently a favored summering and molting area for non-breeding and breeding Canada geese as well (Kessel 1989). In 1992, flocks of 58, 51 and 20 flightless Canada geese were observed on three plots, in addition to a flock of 36 flightless greater white-fronted geese. Sign was also abundantly evident, such as fresh droppings and recently grazed emergent vegetation around wetland margins. Similar observations were made in 1991 (Brown and Jandt 1992). Breeding Canada geese

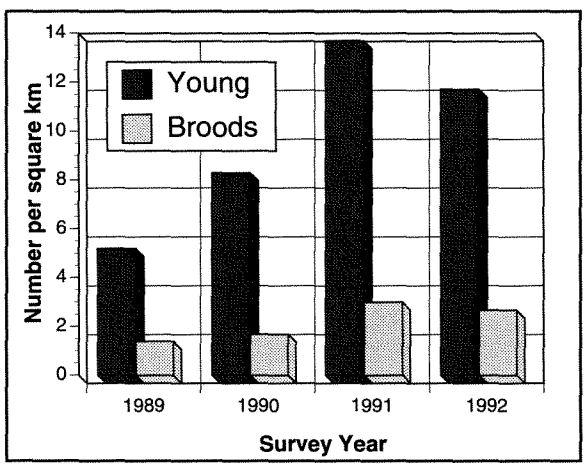

Figure 4. Number of duck broods and young ducks produced per square km in McCarthys Marsh, 1989-1992.

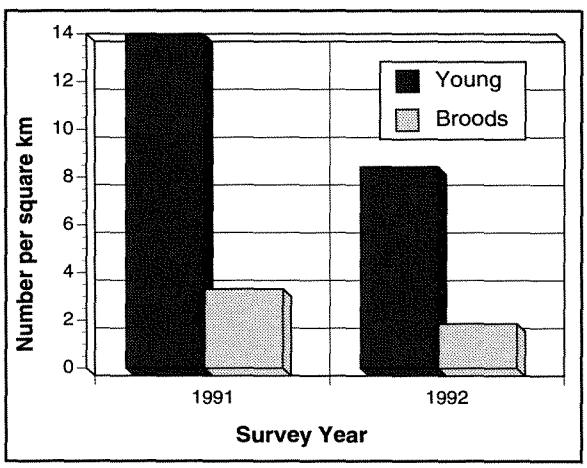

Figure 5. Number of duck broods and young ducks produced per square km in the Kuzitrin River wetlands , 1991-1992.

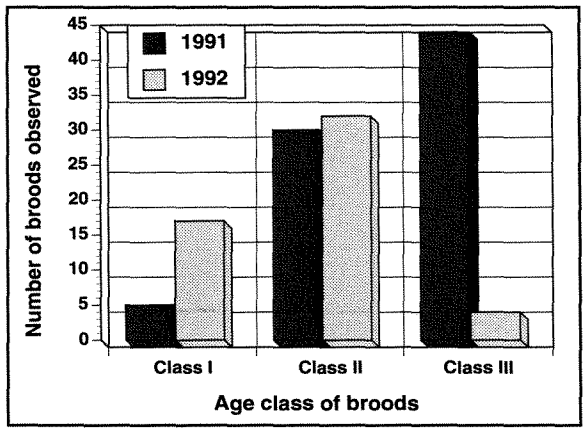

Figure 6a. Age of dabbler broods in Kuzitrin River wetlands, 1991-1992

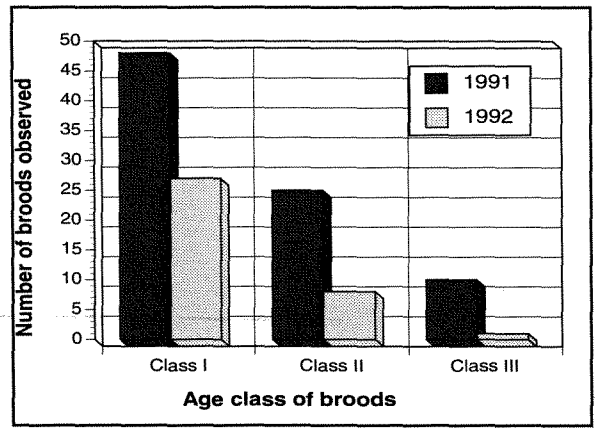

Figure 6b. Age of diver broods in the Kuzitrin River wetlands, 1991-1992

molt their flight feathers in mid through late July (Kessel 1989), which coincided with the timing of our surveys. While McCarthys Marsh may harbor concentrations of molting ducks and geese, they were not noted during waterfowl surveys conducted annually since 1989 (Anderson and Robinson 1991a, 1991b; Brown and Jandt 1992).

In a continuing effort to understand the impact fire has on wetland habitats, an analysis of waterfowl productivity on burned versus unburned plots was conducted. Nine of 15 surveyed plots in the Kuzitrin River burned in 1971. Two of the plots in McCarthys Marsh burned in 1977. As in previous years, no significant differences were found when comparing number of broods and young produced on burned versus unburned plots. The lack of detectable differences may be due to small sample size and age of the burns. Any effect fire may have on the habitat initially may no longer exist. Fire effects on vegetative structure and water quality are greatest immediately following a fire. Without the use of prescribed burns, this is a rare situation to encounter for studying fire effects on waterfowl production. However, between 19 June and 21 July 1992, a wildfire burned on public lands in the Pah River Flats, a tributary of the Kobuk River in northwestern interior Alaska (L. Knapman, BLM-Kobuk District, pers. commun.). A waterfowl brood inventory was conducted in the Pah River Flats in 1989 (Anderson and Robinson 1991a). BLM-Kobuk District has proposed to survey these wetlands in 1993 to compare waterfowl production and habitat characteristics on burned versus unburned plots, and on burned plots pre- (1989 data) and post-fire.

Other wildlife observations incidental to the waterfowl survey are presented. In 1991, rusty tussock moth (*Orgyia antiqua*) caterpillars defoliated many of the limited willow stands in the Kuzitrin River drainage (Brown and Jandt 1992).

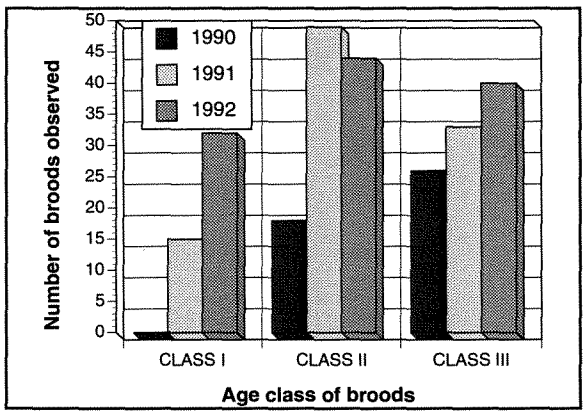

Figure 7a. Age of dabbler broods in McCarthys Marsh, 1990-1992

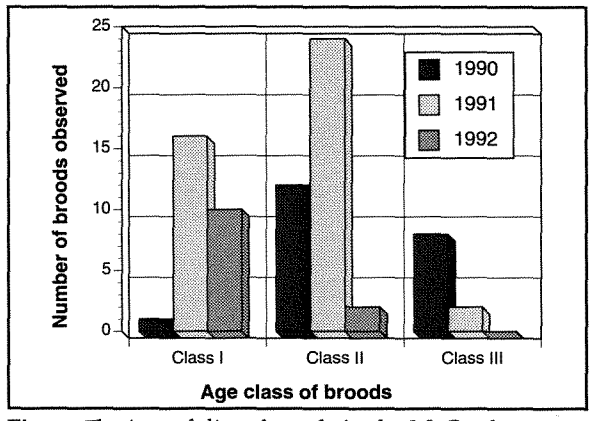

Figure 7b. Age of diver broods in the McCarthys Marsh, 1990-1992

In 1992, few caterpillars were observed and there was no visible damage to the current year's growth. However, in 1992, another insect, the leaf blight miner, damaged foliage in a widespread area on the Seward Peninsula.

Two herds of muskoxen (*Ovibos moschatus*), totaling around 40 animals, were observed from the air while accessing plots in the Kuzitrin River production area. In addition, several large herds of domestic reindeer (*Rangifer tarandus*) were also observed along the river. Moose (*Alces alces*) were observed in both study areas, particularly along the Noxapaga River where many of the willows showed extensive browsing as in previous years (Brown and Jandt 1992). Beaver (*Castor canadensis*) were common in McCarthys Marsh but were not observed in the Kuzitrin River drainage. A pair of light phase gyrfalcon (*Falco rusticolus*) adults and two fledglings were observed on a survey plot in the Kuzitrin River production area, located within the Bering Land Bridge National Preserve. The nest was a scrape on a lava rock ledge overlooking a small lake.

Baseline inventories and monitoring of wildlife populations provide land managers with essential information to assess the effects of land use activities on wildlife populations and their habitats. In addition, the data gained from waterfowl brood surveys in production areas across the state allow wildlife management agencies to estimate waterfowl population numbers, evaluate effects of habitat change and weather effects on regional population trends, and set appropriate harvest levels. In fiscal year 1993, BLM-Kobuk District will conduct waterfowl brood surveys in the Kuzitrin River and Pah River Flats production areas, and complete a final report on its waterfowl production studies on the Seward Peninsula. Future planning efforts may include completing a baseline habitat inventory and determining the relationship between habitat quality and waterfowl production.

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