SELECTIVE FEEDING BY JUVENILE DIVING DUCKS IN SUMMER

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WATERFOWL often fail to use foods that seem plentiful to the investigator. The extent to which selective feeding or rejection of foods is a function of behavioral and morphological adaptations of the species, conditioned behavior of the individual, or individual preference for certain foods has not been appraised. The objectives of our study were to determine: (1) the extent of selective feeding among juvenile Canvasbacks (*Aythya valisineria*) and Redheads (*A. americana*), (2) which food items were and which were not utilized, and (3) how selective use was related to the relative quantity and availability of the food resource. In another paper (Bartonek and Hickey, MS) we present findings on the food habits of juvenile and adult Canvasbacks, Redheads, and Lesser Scaup (*Aythya affinis*) in southwestern Manitoba primarily during late spring and summer.

Only a few of the limited number of investigations into the summer food habits of waterfowl correlate use of foods with the relative quantity and/or availability of potential foods (White, 1936; Beard, 1953; Keith, 1961; Chura, 1961; Perret, 1962; Collias and Collias, 1963). Perret (1962) concluded that seasonal variations in the food habits of Mallards (*Anas platyrhynchos*) were related to changes in the availability of foods.

STUDY AREA

The pothole region near Minnedosa, Manitoba, lies within both prairie and aspen parkland. The numerous potholes, now associated with uplands of cereal crops, hay, pasture, and aspen, make this region one of the most productive waterfowl nesting areas in North America. Southwestern Manitoba has been among the most important breeding areas for Canvasbacks and Redheads. Stewart et al. (1958) reported densities of breeding Canvasbacks in this region to be 2.2 birds per square mile; Weller (1964) reported Redhead densities at 1.0 bird per square mile. Densities of breeding birds in the vicinity of Minnedosa are much higher than those of the entire region; Stoudt (1964) observed densities here as high as 10.1 and 4.1 pairs per square mile for Canvasbacks and Redheads, respectively. Canvasbacks and Redheads occur in the pothole region primarily during the breeding season. Adults later go to certain large lakes before their postnuptial molt, juveniles begin moving to larger lakes soon after fledging. Detailed descriptions of this area and its use by waterfowl appear in Evans et al. (1952), Dzubin (1955), Keil (1955), Perret (1962), Stoudt

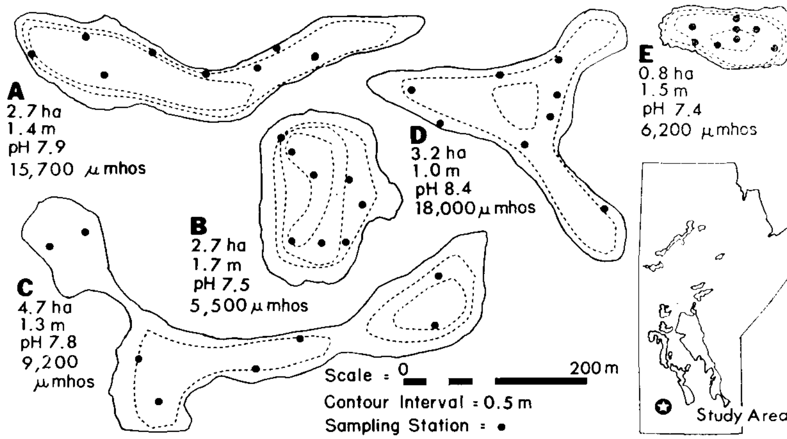

Figure 1. Surface area, maximum depth, pH, specific conductivity, bathymetry, and sampling sites of five study potholes near Minnedosa, Manitoba.

(1962–64), and Olson (1964); Bird (1961) describes the general ecology of aspen parklands.

During the summers of 1962 and 1963 we studied five potholes near Minnedosa selected subjectively on the basis of use by diving ducks during the summer of 1961 to determine relationships between the use of foods by waterfowl and the availability and quantity of potential foods. Figure 1 shows the location and certain physical and chemical characteristics of these potholes.

METHODS

Food use was determined by volumetric measurement of esophageal contents from waterfowl collected on the study potholes. Contents from esophagi were used instead of those from the proventriculi and gizzards because they are more representative of recent food consumption (Bartonek and Hickey, MS). Hatchery-reared ducklings of wild parentage were released on the potholes to supplement numbers of wild birds available for collecting; they remained on the potholes from 1 to 7 weeks prior to being collected.

The availability and quantity of potential foods in the five study potholes were measured by net and dredge samples taken at approximately 2-week intervals during the summers of 1962 and 1963. Eight randomly located sampling stations per pothole were established from aerial photographs. Only stations in open water were selected, and these were marked with a pole. The sampling area about the station varied to the extent that the canoe from which the samples were taken drifted about its point of anchorage.

A "net sample" consisted of organisms collected in eight 2-m-long sweeps through the water with a long-handled dipnet. The net's opening was 25 cm^2; the bag was 50 cm long and made of mosquito netting with maximum openings of approximately

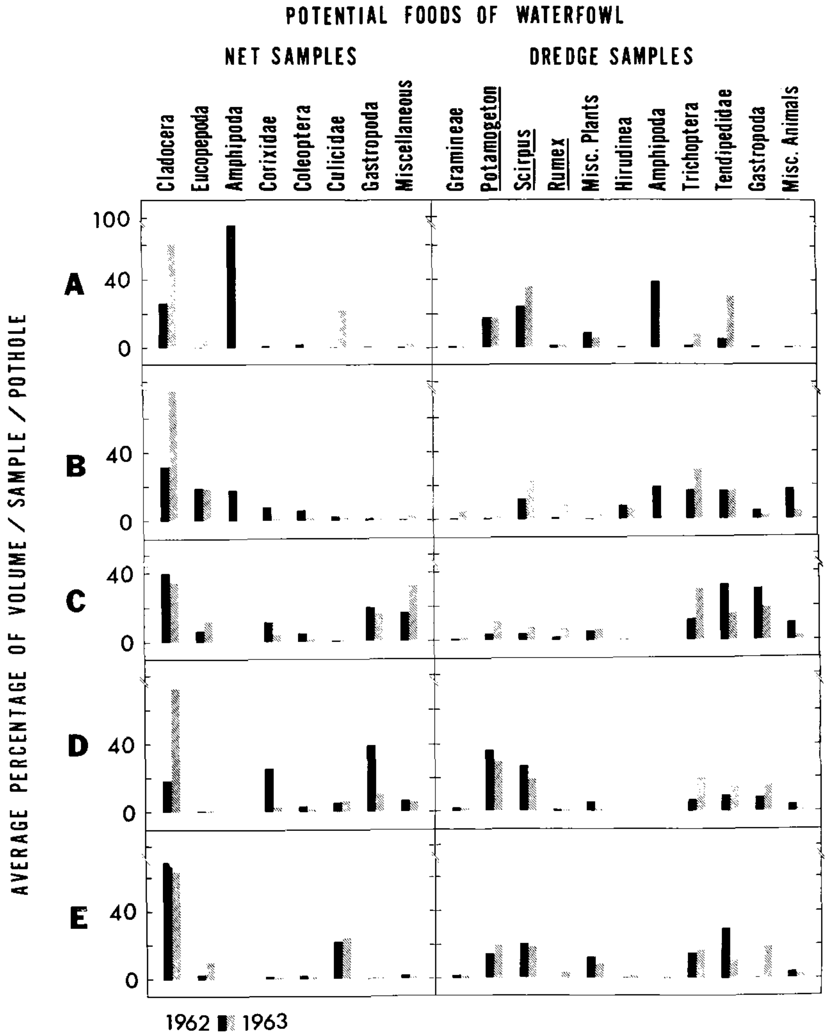

Figure 2. Average percentages of volume for potential foods of waterfowl found in each of five study potholes by net and dredge sampling.

0.5 mm. Arcing sweeps passed the net through water near the surface as well as near the bottom and thus approximated sampling 1 m^3 of water.

A "dredge sample" consisted of the material taken with a 15.2-cm-square Eckman dredge from the bottom of the pond. Dredgings were washed between sieves with maximum openings of 0.420 mm. Contents from net and dredge samples were placed in individual numbered and dated plastic bags. Formalin was then added, the bags were closed by knotting, and the samples were stored until analysis.

We measured only those items in the samples that we considered potential foods

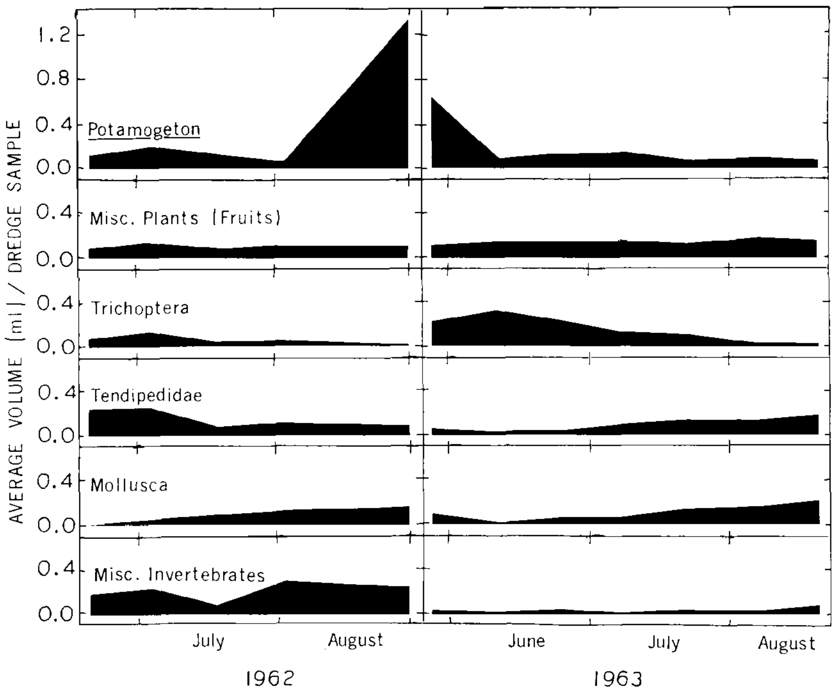

Figure 3. Average biomass of potential foods of waterfowl found in dredge samples taken in five study potholes.

of waterfowl (i.e. invertebrates, vertebrates, plant fruits, and tubers). Detritus, gravel, and vegetative parts of plants, except for pondweed tubers, were not measured; these were usually so voluminous that including them in the analysis would have masked the importance of less voluminous items. We recognize that, in addition to the subjective elimination of certain plant material, these two types of samples are biased in their selectivity of organisms, e.g. most adult coleopterans are more capable of avoiding a net than are copepods or cladocerans.

Food items from the birds and net and dredge samples were sorted and measured volumetrically by displacement of water. These items were wet, but drained, at time of measurement. Resulting data were expressed as "per cent of occurrence" and "per cent of aggregate volume." Samples were compared by using indexes of similarity—an I.S. value of 0.00 would indicate that the groups had nothing in common, and an I.S. value of 1.00 would indicate the groups were identical (cf. Curtis, 1959: 82–83; Ivlev, 1961: 42–45).

AVAILABILITY AND QUANTITY OF POTENTIAL FOODS

Plant material, excluding all vegetative parts except the tubers of *Potamogeton pectinatus*, averaged 43 per cent of the potential foods found in dredge samples from the five potholes during 2 years (Figure 2). The most important plant items were *Scirpus* spp. achenes 19 per cent, *Potamogeton* spp. nutlets and tubers 14 and 1 percent respectively, *Rumex maritima* achenes 3 per cent, and Gramineae caryopses 2 per cent. Fruits of *Myriophyllum exalbescens*, *Chenepodium album*, and *Carex* spp. made up 4 per cent of the total volume, and they were the most important items within the "miscellaneous plants" category.

In spite of germination, decomposition, and consumption by waterfowl, the quantity of seeds taken in dredge samples remained relatively constant throughout the period of sampling (Figure 3). Because tubers of *Potamogeton* either sprouted or decomposed, they were seldom encountered during midsummer. Seeds from such plants as *Potamogeton*, *Scirpus*, *Carex*, *Myriophyllum*, *Ceratophyllum*, and *Ranunculus* appeared to persist longer, possibly for several years, than did either the tubers of *Potamogeton* or the seeds from such plants as *Scolochloa*, *Hordeum*, *Chenepodium*, and *Senecio*. Because of the persistence of certain seeds, the annual production of seeds was probably considerably less than the standing crop.

Seeds are not restricted in their distribution to the vegetative zone in which they were produced. Seeds from both emergent and upland plants were widely distributed throughout the open-water areas of the potholes. Chokecherries (*Prunus virginiana*), for example, grew no closer than 20 feet from the wet-meadow zones of the study potholes, yet their pits were found in seven dredge samples taken in open-water areas and in the gizzard of a juvenile Canvasback.

Of potential foods in dredge samples 57 per cent of the volume was animal material (Figure 2). Percentages of volume of the major animal items were: Tendipedidae larvae 18 per cent, Trichoptera larvae 17 per cent, gastropods 11 per cent, amphipods 5 per cent, and leeches 2 per cent. Conchostracas, coleopterans, zygopterans, cladocerans, sphaerids, and eggs of various invertebrates formed 3 per cent of the potential foods and were major items within the "miscellaneous animals" category.

Less than 1 per cent of potential foods taken in net samples was plant material (Figure 2). This trace amount consisted of seeds that were either floating in the water or had been knocked from plants by the dipnet.

Average percentages of volume for the more important items comprising the animal material were as follows: cladocerans 52 per cent, copepods 8 per cent, amphipods 8 per cent, corixids 5 per cent, coleopterans 2 per cent, culicids (all *Chaoborus* sp.) 9 per cent, and gastropods 8 per cent. Zygopterans, hydracarinids, conchostracas, ephemeropterans, fathead minnows (*Pimephales promelas*), and eggs of invertebrates made up 6 per cent of the total food and were the more important items in the category of "miscellaneous animals."

The kinds and quantities of potential foods varied markedly among the

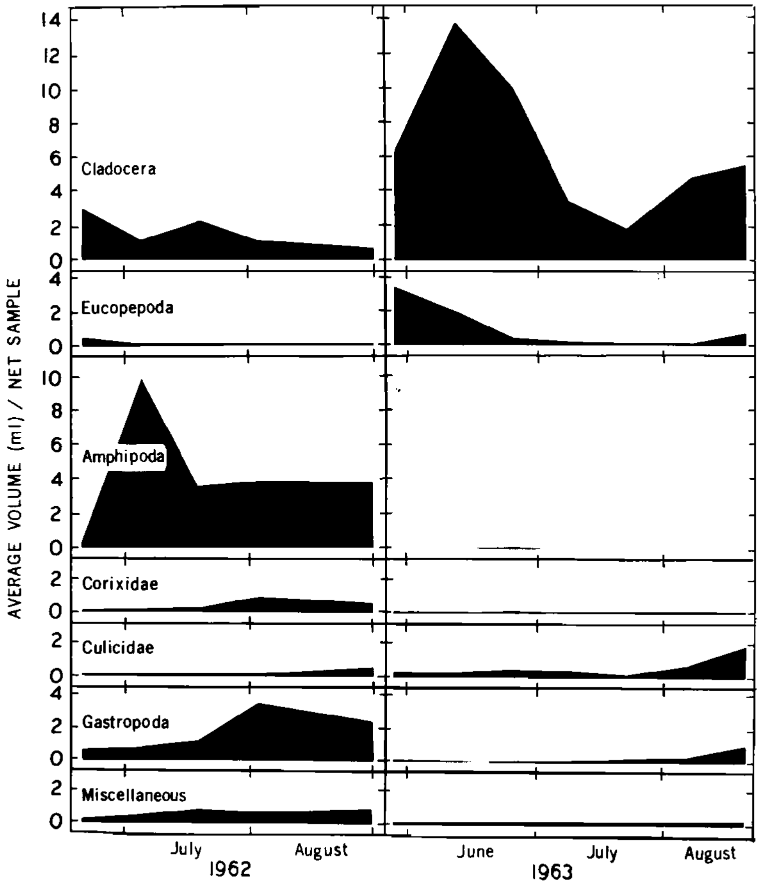

Figure 4. Average biomass of potential foods of waterfowl found in net samples taken in five study potholes.

five potholes (Figure 2) as well as within potholes during the 2 years in which samples were taken (Figures 2, 3, and 4). During 1962, amphipods in potholes A and B, respectively, comprised 71 ± 13 and 18 ± 9 (95 per cent confidence limits, n = 40) per cent of the potential foods taken in net samples and 39 ± 12 and 18 ± 9 per cent in the dredge samples; but, during 1962, these crustaceans were not found in either pond. Conversely, amphipods were not found in potholes D and E during the summer of 1962, but they formed trace amounts of the samples from these ponds in late June 1963.

Fathead minnows, which had not been previously observed in any of the study potholes, were found in pothole C on 25 June 1963. In the 55 days from when the fry were first taken in net samples until the last samples of the summer, these fish grew an average twelvefold (0.002 to 0.024 ml). The populations of cladocerans and copepods decreased from 34.1 ± 42.3 and 2.5 ± 0.5 ml (95 per cent confidence limits, n = 8), respectively, per net sample on 11 June (2 weeks before the appearance of the fish) to none of either crustacean found in samples taken 19 August. During 1962 when no fish were observed, the average quantities of cladocerans and copepods respectively per net sample were 2.8 ± 5.8 and 0.4 ± 0.2 ml on 20 June, and 1.9 ± 2.9 and less than 0.1 on 29 August. Although both regular and irregular fluctuations in zooplankton are recognized (Welch, 1952: 255–261; Pennak, 1953: 356–357) and the confidence limits of these samples are broad, we believe that in this case fish were primarily responsible for reducing the standing crop of cladocerans and copepods to levels where they were not taken in samples. If in fact fish were responsible, then they were competing either directly or indirectly with ducks for these foods. Although fish may have been in the pond prior to our first observation, we believe that ripe adults and/or fry gained access to the pothole through runoff resulting from 3.3 inches of rain that fell from 8 to 10 June.

The biomass of certain potential foods fluctuated markedly during the time span in which samples were taken (Figures 3 and 4). Potamogetons increased in biomass during late August 1962 reflecting the fall production of nutlets and tubers. Their decrease in biomass from a high during the late summer of 1962 to a low in the early summer of 1963 may reflect consumption by waterfowl.

Selective Use of Foods by Ducklings

To evaluate selective use of potential foods we used 35 of 40 Canvasbacks and 14 of 21 Redheads collected on the five study ponds. Net and dredge samples taken at the sampling stations immediately after collecting the ducklings provided estimates of the abundance of available foods. Tables 1 and 2 present data on foods found in esophagi of ducks and in net and dredge samples taken concomitantly and proportionately.

Canvasbacks ranging from less than 1 week old to flying age (approximately 9 weeks or older) had food in their esophagi comprising 94 per cent animal material (Table 1). Larvae and larval cases of Trichoptera and larvae of Tendipedidae were consumed in greatest abundance. Gastropods and insect larvae appeared in smaller quantities. Oögonia of *Chara* comprised the greatest volume of plant material, but achenes of *Scirpus* and caryopses of *Scolochloa* were eaten by more ducks.

The Redheads ranging from 2 weeks old to flying age (approximately 9 weeks or older) had consumed food that was 57 per cent plant material (Table 2). Caryopses of *Scolochloa*, achenes of *Scirpus*, and oögonia of

TABLE 1
FOODS FOUND IN JUVENILE CANVASBACKS[1]

Food item	Common name (part or type)	Per cent occurrence			Per cent aggregate volume		
		Esophageal contents of Canvasbacks	Net samples	Dredge samples	Esophageal contents of Canvasbacks	Net samples	Dredge samples
(Sample size)		(35)	(280)	(280)	(35)	(280)	(280)
Characeae	Muskgrass (oögonia)	9	3	3	5	tr.	tr.
	Muskgrass (vegetative)	6	3	2	tr.	—[2]	—[2]
Potamogeton spp.	Pondweeds (nutlets)	6	3	58	tr.	tr.	40
	Pondweeds (tubers)	3		4	tr.		tr.
Scirpus spp.	Bulrushes (achenes)	23	2	96	tr.	tr.	10
Scolochloa sp.	Whitetop (caryopses)	17		30	tr.		tr.
Chenepodium sp.	Lamb's-quarters (utricles)	6		60	tr.		tr.
Other plants	Misc. plants (seeds)	6	12	80	tr.	tr.	2
	Misc. plants (vegetative)	37	62	50	tr.	—[2]	—[2]
Myriophyllum sp.	Water milfoil (nutlets)			33			1
Ranunculus spp.	Crowfoots (achenes)			7			1
TOTAL PLANT MATERIAL		63	65	100	6	tr.	55
Trichoptera	Caddis flies (larvae)	74	17	43	72	tr.	8
Tendipedidae	Midges (larvae)	54	42	91	15	tr.	11
Gastropoda	Snails	17	24	39	3	4	18
Ephemeroptera	Mayflies (nymphs)	14	22	7	2	tr.	tr.
Odonata	Damselflies, dragonflies (nymphs)	20	32	10	1	tr.	tr.
Corixidae	Water boatmen (adults, nymphs)	14	71	6	tr.	1	tr.
Coleoptera	Aquatic beetles (adults, pupae, larvae)	9	73	19	tr.	tr.	4
Other inverts.	Misc. aquatic invertebrates	6	50	43	tr.	tr.	tr.
Cladocera	Water fleas		92			80	
Chaoborus sp.	Phantom midges (larvae)		63	2		9	tr.
Eucopepoda	Copepods		53	1		3	tr.
Amphipoda	Scuds		5	6		tr.	3
Hirudinea	Leeches		6	10		tr.	tr.
Sphaeridae	Fingernail clams			8			tr.
Pimephales sp.	Fathead minnows		4			tr.	
TOTAL ANIMAL MATERIAL		92	100	99	94	99	45

[1] Percentages of occurrence and aggregate volume, net samples, and dredge samples taken concomitantly from potholes near Minnedosa, Manitoba, during July and August of 1962 and 1963.

[2] Except for tubers of *Potamogeton* spp., the vegetation was not measured because it was usually so voluminous that it masked the values of the other food items.

TABLE 2
FOODS FOUND IN JUVENILE REDHEADS[1]

Food item	Common name (part or type)	Per cent occurrence			Per cent aggregate volume		
		Esophageal contents of Redheads	Net samples	Dredge samples	Esophageal contents of Redheads	Net samples	Dredge samples
(Sample size)		(14)	(112)	(112)	(14)	(112)	(112)
Scolochloa sp.	Whitetop (caryopses)	29	2	19	44	tr.	tr.
Scirpus spp.	Bulrushes (achenes)	57	7	99	8	tr.	14
Characeae	Muskgrass (oögonia)	14	6	3	3	tr.	tr.
	Muskgrass (vegetative)	14	5	4	tr.	–[2]	–[2]
Potamogeton spp.	Pondweeds (nutlets)	7	4	71	1	tr.	10
Chenepodium sp.	Lamb's-quarters (utricles)	7		68	tr.		1
Other plants	Misc. plants (seeds)	21	15	85	tr.	tr.	5
	Misc. plants (vegetative)	29	53	40	tr.	–[2]	–[2]
Myriophyllum sp.	Water milfoil (nutlets)			49			2
Ranunculus spp.	Crowfoots (achenes)			7			2
TOTAL PLANT MATERIAL		100	68	100	57	tr.	34
Trichoptera	Caddis flies (larvae)	64	18	46	38	tr.	11
Tendipedidae	Midges (larvae)	21	25	96	3	tr.	12
Odonata	Damselflies, dragonflies (nymphs)	14	33	7	1	tr.	tr.
Coleoptera	Aquatic beetles (adults, larvae)	21	73	79	tr.	tr.	1
Corixidae	Water boatmen (adults, nymphs)	7	68	6	tr.	tr.	tr.
Ephemeroptera	Mayflies (nymphs)	7	27	9	tr.	tr.	tr.
Other inverts.	Misc. aquatic invertebrates	7	13	12	tr.	tr.	3
Cladocera	Water fleas		96			73	
Mollusca	Gastropods, pelecypods		25	59		5	36
Chaoborus sp.	Phantom midges (larvae)		67	6		13	tr.
Eucopepoda	Copepods		57	2		5	tr.
Hirudinea	Leeches		2	8		tr.	1
Amphipoda	Scuds		4	6		tr.	1
Pimephales sp.	Fathead minnow		10			1	
TOTAL ANIMAL MATERIAL		71	100	100	43	99	66

[1] Percentages of occurrence and aggregate volume, net samples, and dredge samples taken concomitantly from potholes near Minnedosa, Manitoba, during July and August of 1962 and 1963.

[2] Except for tubers of *Potamogeton* spp., the vegetation was not measured because it was usually so voluminous that it masked the values of the other food items.

Chara formed the bulk of plant foods in these ducklings. Larvae and larval cases of Trichoptera and larvae of Tendipedidae were the most important animal material for Redheads as they were for Canvasbacks.

Indexes of similarity between foods ingested by Canvasbacks and those found in net samples and dredge samples were 0.02 and 0.11 respectively. Analogous I.S. values for Redheads were 0.01 and 0.12 respectively. The higher I.S. values between ducks and dredge samples vs. net samples would be expected for the bottom-feeding Canvasbacks and Redheads.

While the confidence limits on our sampling data are clearly broad, we feel sure that the Trichoptera larvae with their cases were consumed in greater proportion than they occurred in the environment (Tables 1 and 2). On the other hand differences in utilization and availability of mollusks and Tendipedidae larvae are probably not great enough to reflect selective use.

Conspicuously absent from ducks (Tables 1 and 2) were the cladocerans, copepods, and phantom midge larvae which were relatively abundant in net samples from all five ponds (Figure 2). Similarly these same zooplankters contributed little or nothing to the food intake of 297 other diving ducks collected in southwestern Manitoba (Bartonek and Hickey, MS). None contained either copepods or phantom midge larvae, only 2 contained mature cladocerans, and 25 contained an average of 10 ± 4 SE ephippia of cladocerans. Possibly some ephippia represented remnants of digested mature cladocerans, but they may also have been eaten as such by the ducks. Collias and Collias (1963) consider *Daphnia* to be an important food of ducklings, and they fed daphnids to hatchery-reared ducklings under artificial conditions. Yet they detected no *Daphnia* among the items found in 20 ducklings of five species they collected on the Delta Marsh. Cottam (1939: 21, 23, 45, 71, 76, 79–80, 105, 113) mentions cladocerans or their ephippia being consumed by only 6 of the 22 species of diving ducks whose food habits he discusses. Except for constituting 7.8 per cent of the food found in 36 juvenile Oldsquaw (*Clangula hyemalis*), cladocerans were relatively unimportant among these six species. Rogers and Korschgen (1966) found daphnids to comprise 7.7 per cent of the volume of foods in 39 adult Lesser Scaup collected during the spring and summer in the potholes near Erickson, Manitoba, but Perret (1962), who was collecting ducks from potholes nearby in Minnedosa, Manitoba reported neither cladocerans nor copepods among 62 juvenile and 96 adult Mallards.

Zooplankton may be of importance to very young Canvasbacks and Redheads which when older may feed primarily upon benthic organisms. Only 5 of the 49 ducklings used in this study were 2 weeks old or less and thus may not adequately represent the diets of the ducklings during the first few days of life.

Factors Influencing Selectivity

The size of a food acceptable to ducks obviously varies with species and age class. Maximum size of food items is somewhat fixed, but minimum size is probably determined by abundance and ease of ingestion (Madsen, 1954: 246; Olney, 1963). Young Canvasbacks and redheads that we watched feeding in a 350-gallon aquarium frequently picked up snails that were too large to swallow, yet adult birds ingested these same snails without difficulty by surfacing and then crushing the shell. The bill was kept in the water during the crushing process so that shell fragments were washed away and very little shell adhered to the soft body that was swallowed. Small ducklings were often unable to crush the shells of large snails, which therefore became potential food only for larger age classes of ducks.

The shell-crushing behavior we noted among hatchery-reared birds feeding in an aquarium we also encountered among wild birds. Most gastropods (Lymnaeidae and Physidae) found in the esophagi of Canvasbacks and Redheads were either entirely without shells or had only fragments of shells attached to the soft bodies. The Planorbidae were an exception, but appeared in limited quantities. Because of the procedures used in collecting and preserving specimens (Bartonek, 1968), neither postmortem digestion, autolysis, nor crushing of the shells within the esophagi is considered a plausible explanation for the absence of intact shells. Millais (1913: 22) reports the Common Pochard (*Aythya ferina*) may pass fish and some roots across its bill several times until they become soft enough to swallow whole, and Erickson (1948: 211) notes Canvasback ducklings "chewing" food, but the shell-crushing behavior apparently has not been described previously. As Cottam (1939) does not mention finding gastropods without shells in any *Aythya,* this phenomenon may either be seasonal in occurrence or perhaps dependent upon the type of gastropod involved. Bent (1925: 43) and Cottam (1939: 60) both claim that Oldsquaws and Common Goldeneyes (*Bucephala clangula*) are capable of picking the soft bodies of pelecypods out of their shells. Madsen (1954: 196, 219) found clam siphons but no shells in a single Oldsquaw, and he reasoned that this case and possibly those Bent and Cottam mention could be explained by birds feeding upon dead and decaying animals. We do not believe either of the above explanations is applicable to our observations.

Minute zooplankton, such as cladocerans and copepods, were seldom found among food ducks consumed in the wild, but they were readily eaten by diving ducks fed under artificial conditions where such zooplankton was the only available food. Two-day-old Canvasbacks and Redheads were placed in an aquarium that had been stocked with daphnids. These ducklings, while straining water through their bills, would jab at and capture individual daphnids even though the latter were in swarms. The feeding action was a combination of the "straining" and "pecking" methods of securing food described by Collias and Collias (1963). As the flightless birds grew older, they became less deliberate in their movements to capture individual zooplankton, but appeared instead to strain the water indiscriminately yet effectively. Adult birds did not feed upon zooplankton in the aquarium, though we believe that had they been left in the aquarium without an alternate food, they would eventually have eaten them. When feeding upon larger foods such as gastropods, Trichoptera larvae, corixids, and Odonata nymphs, adult and juvenile birds jabbed or pecked at any individual organisms they saw; when none were visible, they sieved these organisms from the bottom material.

Diving ducks have generally been reported to swallow before surfacing (Madsen, 1954: 246; Olney, 1963; Olney and Mills, 1963). Diving ducks feeding in the aquarium appeared to swallow only after surfacing; those that did not swallow after surfacing had caught no food.

The smallest items frequently encountered in foods consumed by Canvasbacks, Redheads, and Lesser Scaups were the fruits of muskgrass (*Chara* sp.), lamb's-quarters (*Chenepodium album*), and hard- and soft-stem bulrushes (*Scirpus acutus*, *S. validus*). Other small but less frequently occurring items included the fruits of spike-rush (*Eleocharis* spp.), water-crowfoot (*Ranunculus* spp.), and water-milfoil (*Myriophyllum* sp.), and the ephippia of cladocerans. Under conditions when minute organisms become concentrated, such as oögonia of *Chara* windrowing on the bottom of the pond or ephippia of cladocerans windrowing along the shoreline, ducks can and apparently do feed effectively upon these small foods. In some cases birds obviously have gleaned oögonia from the plant, for we found the reproductive bodies still attached to the vegetative branches.

None of the ponds in the Minnedosa area appeared to be too deep (1.8 m maximum) to preclude ducklings from using at least some portion of the bottom. Diving ducks were frequently seen feeding in depths requiring ducklings to dive while the hen tipped up in the fashion of dabbling ducks. Observations of hatchery-reared ducklings in an aquarium showed that 1-day-old Canvasbacks, when frightened, were capable of diving to 0.5 m, and a 3-day-old Lesser Scaup, which once stayed submerged for 9 seconds, could successfully dive, capture a fathead minnow, and surface in less than 5 seconds.

The diets of duckling Canvasbacks and Redheads have many foods in common. Theoretically we would expect their food habits to have evolved so that interspecific competition for food would not occur if food were a critical limiting factor in the environment. The fact that such specialization has not taken place suggests that this has not been important historically, and other factors have been more influential in affecting populations. Olson (1964: 69), also from studies in southwestern Manitoba, concluded that Redheads may be replacing Canvasbacks as breeding populations in certain habitats and that the similarity between their nesting vegetation, chronology of nesting, and breeding range suggests competition for habitat may exist. He further concluded that the parasitic egg-laying by Redheads in Canvasback nests may be an additional means of competition, whereby the productivity and population of Redheads increase at the expense of Canvasbacks.

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Summary

The foods eaten by 49 juvenile Canvasbacks and Redheads were compared with the availability and abundance of potential foods in five potholes near Minnedosa, Manitoba.

Animal material comprised 57 per cent of the potential foods in dredge samples taken throughout two summers and over 99 per cent in net samples. The kinds and quantities of foods varied markedly among the potholes as well as within potholes during the two summers. Amphipods were abundant in two ponds during the first summer but disappeared during the second. Fathead minnows appeared in one pond and were believed responsible for reducing the standing crop of zooplankton.

Of the food taken by juvenile Canvasbacks and Redheads, 96 and 43 per cent respectively consisted of animal material. Trichoptera larvae with cases were an important food of both species, and they were apparently consumed in a proportion greater than found in the environment. Cladocerans, copepods, and phantom midge larvae were abundant (69 per cent of the potential foods) in the potholes, but they were conspicuously absent from foods found in ducks. The close similarity between foods in ducks and dredge samples vs. net samples was expected for these bottom-feeding birds.

Canvasbacks and Redheads crushed shells of certain mollusks before ingesting their soft bodies. Some snails were soo large for small ducklings to swallow. A 3-day-old Lesser Scaup, which stayed submerged in an aquarium for 9 seconds, could successfully dive, capture a minnow, and surface in less than 5 seconds.

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