THE IMPORTANCE OF EURASIAN MILFOIL (*Myriophyllum spicatum*) AS A WATERFOWL FOOD

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ABSTRACT

The primary objectives of the study were to determine and document waterfowl use of Eurasian milfoil in the vicinity of a new outbreak near Back Bay and Mackay Island National Wildlife Refuges in Virginia and North Carolina.

Digestive tracts were collected in the vicinity of Back Bay, Virginia, and Currituck Sound, North Carolina, during the 1968-69, 1969-70 and 1970-71 hunting seasons. Examinations of 170 waterfowl digestive tract contents included 27 Canada geese, 74 dabbling ducks of six species, 38 diving ducks of four species and 31 coots. Analysis revealed that: 71.8 percent contained Eurasian milfoil, 84.7 percent held other foods, 13.5 percent had milfoil as the only food, 27.1 percent had other foods but no milfoil and 1.8 percent had no food.

Quantitative analysis showed that the content of all digestive tracts was 43.9 percent grit, 18.3 percent Eurasian milfoil and 37.8 percent other foods. When considering food only in the 170 tracts of 12 waterfowl species, milfoil comprised approximately one-third of the volume. Highest milfoil use was noted in scaups, followed in order by gadwalls, widgeons, Canada geese, redheads, pintails, green-winged teals, ruddy ducks, black ducks, coots, mallards and canvasbacks. Natural foods led the "other foods" category and were headed by pondweeds, widgeongrass, southern naiad, wild celery plants and seeds, and by seeds from the family Cyperaceae.

INTRODUCTION

The Back Bay (Virginia) and Currituck Sound (North Carolina) area traditionally overwinters a high percentage of the Atlantic Flyway's waterfowl. Commercialized waterfowl hunting is centered around these locations in both States. Minimum industrialization and clear shallow water were responsible for vast acres of top quality submergent waterfowl foods. These included widgeongrass, sago pondweed, southern naiad, wild celery and muskgrasses. During the 1950's waterfowl numbers began to dwindle in the area and in 1958 Virginia, North Carolina and the Patuxent Wildlife Research Center began a six-year cooperative ecological study. The study, which was terminated in 1964, showed an abundance of the above foods, but no Eurasian milfoil. In 1965 the first milfoil infestation was noted in Back Bay and by the end of that year milfoil had spread into Currituck Sound. Eurasian milfoil has continued to spread throughout both areas since 1965 and is located in abundance in both the 120,000-acre bay and sound.

Almost as quickly as the spread of the weed, waterfowl numbers also increased significantly. Overwintering waterfowl were observed feeding in the dense milfoil beds despite many reports to the contrary. Back Bay National Wildlife Refuge personnel, under the guidance of Refuge Manager Don Ambroson, collected four ducks feeding in Refuge milfoil beds in 1967, and my examination showed heavy utilization of the weed. At about the same time an infestation of Eurasian milfoil was discovered at Chassahowitzka National Wildlife Refuge on the west coast of central Florida. Three widgeon, two gadwalls and a coot were collected there by Refuge personnel and analysis showed that 90 percent of their food volume was milfoil, although an abundance

of widgeongrass was also available in the same area. With this limited knowledge we proceeded with plans for an expanded study with the common waterfowl species in the Back Bay-Currituck area.

A study was designed to sample the important dabbling duck species and some geese and coots the first year (1968-69 season) with diving ducks, more geese and coots the second year (1969-70 season). A change of personnel at both Back Bay and Mackay Island National Wildlife Refuges, however, resulted in a poor second year sample and the study was extended to include diving duck, goose and coot samples from the 1970-71 season as well.

PROCEDURES

All birds used in the study were contributed by hunters or guides and were harvested during the regular open hunting season. First-year birds' digestive tracts were collected, dated, identified by species, bagged individually and kept in 10 percent formalin. Second-year tracts were frozen individually prior to submersion in formalin before analysis. Third-year samples were put in formalin in species groups.

Volumetric replacement of wet solids, to the nearest one-quarter of a milliliter, was used to estimate volume of grit, milfoil and other foods. Milfoil seeds were unusually difficult to measure and separate from grit and thus were sometimes estimated at 400 seeds per milliliter. Unidentified seeds were sent to Biologist Fran Uhler of Patuxent Research Center for identification. Unidentifiable plant materials were grouped as such since breakdown made any positive identification nearly impossible. Other foods were categorized as "much," "significant" or "trace." Rather than show contents for individual birds, results are presented by waterfowl species and frequencies of occurrence for the various foods found.

RESULTS AND DISCUSSION

During the three-year study 170 digestive tracts were collected and analyzed. These came from 27 Canada geese, 112 ducks (of which 74 were dabbling ducks of six species and 38 were divers of four species), and 31 coots. Digestive tracts included gizzards, proventriculi, and esophygi in 90 cases, gizzards and proventriculi in 34 cases and gizzards only in 46 samples. No correlation of contents volume per portion of tracts missing was attempted nor was expansion for missing parts taken into consideration.

Quantity of Milfoil per Species

Excluding grit, Eurasian milfoil comprised nearly a third (32.6 percent) of the total food volume of the 170 waterfowl. This varied annually from 45.5 percent in 1968-69 to 34.9 percent in 1969-70 to 25.6 percent in 1970-71. The decreasing order is more than likely due to changes in the species analyzed. As mentioned previously, the 1968-69 sample was composed primarily of dabbling ducks, the small 1969-70 sample was mostly Canada geese and coots and the 1970-71 sample was primarily diving ducks and coots.

Annual differences in use were, however, particularly evident in Canada geese and coots between 1969-70 and 1970-71 when enough samples of both species were collected. Canada geese consumption of milfoil was low (17.1 percent) in 11 geese collected and examined from 1969-70 while in thirteen 1970-71 geese, milfoil accounted for 61.5 percent of all the food volume. In reverse, milfoil use in six 1969-70 coots amounted to 81.0 percent while in a 1970-71 sample of 25 coots, only 7.6 percent of the food was milfoil.

Considering all 12 species of waterfowl examined during the three study years, the milfoil consumption was in the following order from highest to lowest users:

scaups (93.3%), gadwalls, widgeons, Canada geese, redheads, pintails, green-winged teals, ruddy ducks, black ducks, coots, mallards and canvas backs (1.0%). Individual species percentages are presented in Table 2.

A total of 23 waterfowl, or 13.5 percent of the 170 sampled, had milfoil as the only food present. By species, these included 9 of 18 widgeon, 4 of 27 Canada geese, 3 of 14 pintails, 2 of 5 gadwalls, 2 of 28 ruddys, 2 of 31 coots and 1 of 11 green-winged teals.

Other Foods Found in Samples

Approximately two-thirds of all foods found were other than Eurasian milfoil Of these, pondweeds, widgeongrass, southern naiad and wild celery were most abundant in the Canada geese. Agricultural crops of milo, corn, soybeans and wheat occurred in only 5 of 27 geese. Cyperaceae seeds were the most important foods in black ducks, mallards and pintails, with pondweeds and widgeongrass also important in the latter species. Oddly enough, myrtle seeds also played a fairly important role in these three duck species occurring in 13 of 40 samples. Pondweeds and widgeongrass were important foods in widgeons, whereas seeds of the family Cyperaceae were most important in the green-winged teals. Various unidentifiable vegetative portions were the most frequent foods in the ruddy ducks examined although seeds of Cyperaceae, southern naiad, pondweeds and widgeongrass also were prevalent. Pondweed and widgeongrass plants and seeds were the most abundant foods in the six canvasbacks analyzed, whereas southern naiad plants were the most prevailing food found in the coot samples.

SUMMARY AND CONCLUSIONS

Despite reports to the contrary, data from this three-year study on Back Bay, Virginia, and Currituck Sound, North Carolina, show that Eurasian milfoil is indeed an important source of food for some species of overwintering waterfowl. These species include Canada geese and widgeon especially and quite possibly gadwalls, scaups and pintails. Coot consumption of milfoil was low although the species has been on an increase in the area since the milfoil infestation began in 1965. Widgeon and gadwall populations have increased tremendously in the area since initial infestation. Canada goose numbers have held steady despite significant losses in populations elsewhere throughout the Southeast.

ACKNOWLEDGEMENTS

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Table 1. Calendar and Species Distribution of Waterfowl Samples for Back Bay-Currituck Stomach Analysis - 1968-69, 1969-70, 1970-71 Seasons

	Months Collected									
	1968-69			1969-70			1970-71			
Species	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.	Totals
Canada Goose	1	1	1		7	4		8	5	27
Black Duck		4	9							13
Mallard		3	10							13
Gadwall		1	4							5
Pintail			14							14
Widgeon		1	17							18
Green-winged Teal		6	5							11
Ruddy Duck					1	1	6	11	9	28
Scaup					2					2
Redhead					1			1		2
Canvasback							6			6
Coot						6	15	10		31
Totals	1	16	60	0	11	11	27	30	14	170

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Table 2. Incidence and Amounts of Grit, Eurasian Milfoil and Other Foods in Waterfowl Digestive Tracts from Back Bay, Virginia, and Currituck Sound, North Carolina, 1968-71

Number of Samples	Species Composition	Milliters in Sample			Milfoil Present			Other Foods Present			Percentage of Contents per Species			Percentage Food Only 1 Species	
		Total	Avg.	Grit	Yes	No	Ml's	Yes	No	Ml's	Grit	Milfoil	Other Foods	Milfoil	Others
27 Canada Geese	15.9	621¾	23.0	314	18	9	161	21	6	146¾	50.5	25.9	23.6	52.3	47.7
13 Black Ducks	7.6	68	5.2	29½	5	8	5½	13	0	33	43.4	8.1	48.5	14.3	85.7
13 Mallards	7.6	90	6.9	30½	4	9	6½	13	0	53	33.9	7.2	58.9	11.0	89.0
5 Gadwalls	3.0	33½	6.7	15½	3	2	16	2	3	2	46.3	47.8	5.9	88.9	11.1
14 Pintails	8.2	64	4.6	24	9	5	14	11	3	26	37.5	21.9	40.6	35.0	65.0
18 Widgeons	10.6	115	6.4	53	15	3	44	9	9	18	46.1	38.3	15.6	71.0	29.0
11 G. W. Teals	6.5	19	1.7	6½	9	2	2½	10	1	10	34.2	13.2	52.6	20.0	80.0
74 Dabbling Ducks	43.5	389½	5.3	159	45	29	88½	58	16	142	40.8	22.7	36.7	38.4	61.6
28 Ruddy Ducks	16.5	53½	1.9	28½	25	3	4¼	26	2	20¾	53.3	7.9	38.8	17.0	83.0
2 Scaups	1.2	10½	5.3	6¾	2	0	3½	2	0	¼	64.3	33.3	2.4	93.3	6.7
2 Redheads	1.2	8½	4.3	6¼	1	1	1	2	0	1¼	73.5	11.8	14.7	44.4	55.6
6 Canvasbacks	3.5	47½	7.9	22½	3	3	¼	6	0	24¾	47.4	0.5	52.1	1.0	99.0
38 Diving Ducks	22.4	120	3.2	64	31	7	9	36	2	47	53.3	7.5	39.2	16.1	83.9
31 Coots	18.2	545¾	17.6	198½	28	3	48½	29	2	298¾	36.4	8.9	54.7	14.0	86.0
170 Waterfowl	100.0	100.00	9.9	735½	122	48	307	144	26	634½	43.9	18.3	37.8	32.6	67.4