

Food habits of sea ducks from the north-eastern United States

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Summary

During the 1964-1965 hunting seasons, 274 gizzards of five sea duck species—American Eider, White-winged Scoter, Surf Scoter, American Black Scoter, and Long-tailed Duck—were collected from hunters at five localities between central Maine and Long Island, New York, in the United States of America. Based on occurrence and volume, the 16 most important foods are listed. Only animal material was consumed as food. Molluscs were by far the most important, particularly the blue mussel. Of the crustaceans, green crabs were the most important. The sand lance was the only fish found. None of the important food items are of economic importance in the United States.

Introduction

Most of the sea ducks are circumpolar in distribution. Their conservation and management are therefore of concern to a number of countries. There have been only two major publications on the food habits of this group. Cottam (1939) reported on sea ducks from both coasts of North America, based on analysis of birds collected primarily in the first decade of the 20th century. In Europe, the most important work has been by Madsen (1954).

This paper will discuss food habits of 274 ducks collected from hunters on the north-eastern coast of the United States during the winters of 1964 and 1965. The results of this study are compared with those of Madsen and Cottam. The original individual food habits cards used by Cottam are on file at the Patuxent Wildlife Research Centre and were used to extract data for the east coast of the United States.

The birds were collected for the Bureau's Migratory Bird Populations Station to study methods of determining sex and age by wing plumage. To make maximum use of specimens, a food habits analysis was conducted.

Methods

During the hunting seasons of 1964 and 1965 (October to January), hunters shooting sea ducks off the north-east coast of the United States were requested to supply birds to the U.S. Bureau of Sport Fisheries and Wildlife.

Major harvest areas were:

1. Maine — Penobscot Bay and Frenchman's Bay, between latitude 44° and 44° 30'.
2. Rye-Newburyport — Rye Harbor, New Hampshire; Newburyport,

Massachusetts, at the mouth of the Merrimack River, latitude 43°.

3. Plymouth-Duxbury — Plymouth and Duxbury Bays in central coastal Massachusetts, latitude 42°.
4. Monomoy — Monomoy Peninsula at the outer end of Cape Cod, Massachusetts, latitude 41° 30'.
5. Long Island Sound — between Connecticut and central Long Island, New York, latitude 41°.

Of more than 500 birds received, 274 contained sufficient food material for analysis. Included were 124 White-winged Scoters *Melanitta fusca deglandi*, 70 American Eiders *Somateria mollissima dresseri*, 55 Surf Scoters *Melanitta perspicillata*, 17 American Black Scoters *Melanitta nigra americana* and eight Long-tailed Ducks (Old Squaw in North America) *Clangula hyemalis*. The nomenclature is that of Delacour (1959). With the exception of the Surf Scoter, all these species are circumpolar in distribution.

Food items removed from the proventriculus and gizzard were recorded by occurrence and volume. All items found in the proventriculus were also present in the gizzard. Because of this and the relatively few birds with food in the proventriculus, only gizzard content is discussed. These ducks fed on few items and usually one item predominated in each stomach. Food habits by age, sex, and area taken were examined within each species to determine any significant differences.

The scientific and common names of Mollusca used here are from Abbott (1954). Those of other invertebrate animals are from Pratt (1935).

Results

American Eider

Of the 70 gizzards examined, 14 were from Maine, 12 from Plymouth-Duxbury, and 45 from Monomoy. The sex and age composition was 33 females (14 adult, 2 subadult, and 17 immature) and 37 males (18 adult, 7 subadult, and 12 immature).

Area of collection, sex, and age did not make any discernible difference in the food habits of American Eiders. Blue mussels *Mytilus edulis* were by far the

most important food, being found in 87 per cent of the gizzards and constituting 70 per cent of the total volume (Table I). They were found in 68 per cent of the birds examined by Madsen in Denmark and 81 per cent of the birds examined by Cottam (1939). Wintering areas of Common Eiders, both American and European, seem to be strongly influenced by the location of blue mussel beds.

Only two other items were found in over 10 per cent of the gizzards. Green crabs *Carcinides maenas* occurred in 20

Table I. Gizzards contents of 274 sea ducks from north-eastern U.S.A. listed (a) by percentage of occurrence and (b) by volume of each food.

Food species listed in descending frequency of occurrence in the total sample.

	American Eider	White-winged Scoter	Surf Scoter	American Scoter	Long-tailed Duck	all species
(a) % occurrences gizzards	70	124	55	17	8	274
<i>Mytilus edulis</i>	87.1	11.3	23.6	47.0	—	35.0
<i>Nassarius trivittatus</i>	7.1	34.7	3.6	5.8	25.0	19.3
<i>Littorina obtusata</i>	14.2	21.8	14.5	—	—	16.4
<i>Nucula proxima</i>	—	19.3	10.9	17.6	62.5	13.8
<i>Yoldia thraciaeformis</i>	—	21.0	10.9	—	—	11.6
<i>Carcinides maenas</i>	20.0	11.3	—	—	—	10.2
<i>Thais lapillus</i>	2.8	17.7	—	—	—	8.7
<i>Yoldia limatula</i>	—	10.5	10.9	23.5	12.5	8.7
<i>Ammodytes americanus</i>	—	18.5	—	—	12.5	8.7
Talitridae sp.	—	0.8	16.3	11.7	—	4.3
<i>Littorina littorea</i>	8.5	4.8	—	—	—	4.3
Gammaridae sp.	—	8.1	—	—	—	3.6
<i>Yoldia sapotilla</i>	—	—	14.5	—	—	2.9
<i>Siliqua costata</i>	—	1.6	9.0	—	—	2.5
<i>Nuculana tenuislocata</i>	—	4.0	3.6	—	—	2.5
<i>Panopeus herbstii</i>	—	0.8	—	—	62.5	2.1
other animal species	7.1	6.4	1.8	5.8	—	5.4*
algae sp.	45.7	—	—	—	—	11.6

* 15 occurrences: *Anachis translirata* (4); *Libinia* sp. (3); *Urosalpinx cinerea*, *Aequipecten irradians* (2); *Buccinum undatum*, *Crassostrea virginica*, *Chiridotea caeca*, *Ovalipes* sp. (1).

	American Eider	White-winged Scoter	Surf Scoter	American Scoter	Long-tailed Duck	all species
(b) volume c.c.	1172	1529	359	75	65	3200
<i>Mytilus edulis</i>	70.1	8.1	22.6	54.1	—	34.4
<i>Nassarius trivittatus</i>	0.6	9.7	0.2	4.0	trace	5.1
<i>Littorina obtusata</i>	3.9	12.2	7.2	—	—	8.3
<i>Nucula proxima</i>	—	4.8	5.0	12.7	14.6	3.5
<i>Yoldia thraciaeformis</i>	—	10.8	9.5	—	—	6.4
<i>Carcinides maenas</i>	12.8	6.6	—	—	—	8.0
<i>Thais lapillus</i>	1.2	17.3	—	—	—	9.0
<i>Yoldia limatula</i>	—	8.8	8.0	25.6	33.8	6.5
<i>Ammodytes americanus</i>	—	9.6	—	—	2.3	4.8
Talitridae sp.	—	0.2	8.0	3.6	—	1.0
<i>Littorina littorea</i>	0.2	1.0	—	—	—	0.6
Gammaridae sp.	—	3.6	—	—	—	1.6
<i>Yoldia sapotilla</i>	—	—	24.2	—	—	2.8
<i>Siliqua costata</i>	—	0.3	12.6	—	—	1.5
<i>Nuculana tenuislocata</i>	—	1.6	2.5	—	—	1.0
<i>Panopeus herbstii</i>	—	0.2	—	—	49.2	1.1
other animal species	2.1	5.4	0.1	trace	—	1.0
total animal	90.9	100.2	99.9	100.0	99.9	96.6
algae sp.	9.1	—	—	—	—	3.4

per cent, and northern yellow periwinkle *Littorina obtusata* was found in 14 per cent of the gizzards (Table I).

Algae occurred in 45 per cent of the stomachs, but this was probably incidental ingestion because it adhered to the blue mussels.

White-winged Scoter

Of the 124 White-winged Scoters examined, 25 were from Maine, 26 from Rye-Newburyport, 14 from Plymouth-Duxbury, and 59 from Long Island Sound. Fifty were females (20 adult, 3 subadult, and 27 immature) and 74 were males (46 adult, 7 subadult, and 21 immature). Though there were no differences in food habits due to sex or age, there were very noticeable differences between areas.

Atlantic dogwinkles *Thais lapillus* were found in over one-half of the gizzards and constituted over one-half of the volume of food from Maine birds. In Massachusetts blue mussels and broad yoldia *Yoldia thraciaeformis* made up the bulk of the food. Long Island Sound birds had a much more varied diet with sand lance *Ammodytes americanus*, New England nassa *Nassarius trivittatus*, northern yellow periwinkle and file yoldia *Yoldia limatula* the most prominent in occurrence and volume (Table II).

f. fusca fed primarily on cockles (*Cardium* sp.), blue mussels, dog whelk *Nassa reticulata* and periwinkles (*Nassarius* sp.) in Denmark.

Surf Scoter

Fifty-five Surf Scoters were examined: 14 from Maine, 14 from Rye-Newburyport, 18 from Plymouth-Duxbury, and 9 from Long Island Sound. The 27 females included 3 adults, 5 subadults, and 19 immatures. The 28 males included 8 adults, 3 subadults, and 17 immatures.

The sample is too small to reflect accurately regional differences in food habits, but some differences were evident. Only birds from Massachusetts contained blue mussels and short yoldia *Yoldia sapotilla* and these were the two most important items. Beach fleas (Talitridae) were the most important food in the small Maine sample. Atlantic razor clams *Siliqua costata* made up the bulk of food in Long Island Sound birds.

Most of the New England birds reported by Cottam (1939) were from Massachusetts, and blue mussels were by far the most important food.

American Black Scoter

This is a relatively uncommon sea duck on the Atlantic coast and only 17

Table II. Comparison of White-winged Scoter foods from three areas in north-eastern U.S.A.

Percentages of occurrence and of volume.

Food	Area					
	Maine		Massachusetts		Long Island Sound	
	Occ.	Vol.	Occ.	Vol.	Occ.	Vol.
<i>Mytilus edulis</i>	3.4	1.3	33.3	33.5	1.6	0.1
<i>Nassarius trivittatus</i>	6.8	1.4	22.2	11.7	55.9	14.9
<i>Littorina obtusata</i>	17.2	4.9	16.6	6.1	27.1	20.8
<i>Nucula proxima</i>	20.6	6.9	13.8	2.7	22.0	4.3
<i>Yoldia thraciaeformis</i>	6.8	2.8	44.4	30.3	13.5	6.9
<i>Carcinides maenas</i>	6.8	6.8	11.1	5.8	13.5	6.9
<i>Thais lapillus</i>	55.1	51.8	2.7	0.5	8.4	0.5
<i>Yoldia limatula</i>	—	—	2.7	1.4	20.3	19.0
<i>Ammodytes americanus</i>	—	—	—	—	38.9	21.6

Because birds from both the Atlantic and Pacific coasts were combined in Cottam's publication and many scoters were deliberately collected over oysterbeds, the original cards used in his study were examined for comparable information. The cards revealed that Massachusetts birds (mostly collected in 1922) primarily contained blue mussel, northern yellow periwinkle, and scallop *Pecten irradians*.

Madsen (1954) found that the European White-winged or Velvet Scoter *Melanitta*

usable gizzards were available. Six were from Maine, 9 from Plymouth-Duxbury, and 2 from Long Island Sound. Of the 12 females, 2 were adult, 2 subadult, and 8 immature. All five males were immature.

Blue mussels were found in nearly one-half of the gizzards and comprised over one-half the total volume. The file yoldia and Atlantic nut clam *Nucula proxima* were the only other two items of importance (Table I).

Of 57 birds from New England

reported by Cottam, 37 contained blue mussels. The sand dollar (*Clypeastroidea* sp.) was the only other significant item.

Madsen (1954) found that the European Black Scoter *Melanitta n. nigra* also fed heavily on blue mussels, which were found in over half of 219 birds examined. Cockles were the only other important items.

Long-tailed Duck (Old Squaw)

Only eight gizzards contained enough food to be usable. One bird was from Massachusetts and seven from Long Island Sound. There were six females (five adults and one immature) and two adult males. Mud crabs *Panopeus herbstii* were the most important item, being found in five gizzards and constituting 49 per cent of the total volume (Table I).

Cottam (1939) found that in 190 gizzards crustaceans made up nearly one half the total volume and molluscs only 15.7 per cent. In contrast, 174 Danish birds examined by Madsen (1954) contained 93.8 per cent molluscs, primarily cockles. Although crustaceans were found in 54.9 per cent of the stomachs, they were the sole food in only 3.5 per cent.

Grit and Lead Shot

Due to the predominantly molluscan diet of most sea ducks, grit (gravel and sand) appears to be of less importance than it is to other ducks. Among species the frequency of grit ranged from 51.4 per cent in Eiders down to 29.4 per cent in Black Scoters. In most gizzards the amount of grit in relation to the total content was low. The volume ranged from 13.3 per cent in Eiders down to 5.7 per cent in White-winged Scoters.

Lead poisoning, due to waterfowl ingesting spent shot in feeding areas, has become of serious concern in North America. It particularly affects certain

dabbling ducks, such as the Mallard *Anas p. platyrhynchos*, Black Duck *Anas rubripes*, and Pintail *Anas a. acuta*, and inland divers of the genus *Aythya*, which appear to be particularly susceptible. Bellrose (1959) estimated that about 4 per cent of the Mallard in the Mississippi Flyway die of lead poisoning annually. Over 10 per cent of 3,400 inland divers were found to contain ingested lead shot. Of 274 birds examined in this study, six contained ingested lead shot. One Eider contained two shot. Three Eiders, one White-winged Scoter, and one Surf Scoter contained one shot each. This indicates that lead poisoning is not a serious problem in sea ducks.

Conclusions

Sea ducks examined in this study fed entirely on animal material. Molluscs were the most important food and were found in 92.7 per cent of all gizzards. They constituted 79.1 per cent of the total volume of food. Crustaceans were found in 21.5 per cent of the gizzards and made up 11.7 per cent of the volume. The sand lance was the only fish eaten and it occurred only in White-winged Scoters and Long-tailed Ducks from Long Island Sound. It was found in 8.7 per cent of the stomachs and made up 4.8 per cent of the total food volume.

The animals consumed are of no importance to the American fish or shellfish industry.

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References

- ABBOTT, R. T. 1954. *American Seashells*. D. Van Nostrand Company, Inc. 541 pp.
- BELLROSE, F. C. 1959. Lead poisoning as a mortality factor in waterfowl populations. *Illinois Natural History Survey Bull.* 27(3) : 288 pp.
- COTTAM, C. 1939. Food habits of North American diving ducks. *U.S. Department of Agriculture Tech. Bull.* No. 643, 140 pp.
- DELACOUR, J. 1959. *The Waterfowl of the World*. Vol. III. Country Life, London.
- MADSEN, F. J. 1954. On the food habits of the diving ducks in Denmark. *Danish Rev. of Game Biology* 2(3) : 157-266.
- PRATT, H. S. 1935. *A Manual of the Common Invertebrate Animals*. P. Blakiston's Son & Co., Inc., Philadelphia, Penn. 854 pp.