Along the British Columbia coast for about two weeks in October there is a constant succession of flocks of females and young of this and the preceding species, the numbers that pass must be incalculable.

There is no reliable record of its breeding in the Province, although I have seen them vigorously courting in central British Columbia, well along in June; three or four males whirling about a female on the water like whirling beetles, and uttering a curious low, liquid note, like water dropping in a cavern. Large numbers of both this and the White-winged Scoter die from parasitic diseases (intestinal), but nothing to the thousands that are killed through contact with floating patches of crude oil at sea.

Okanagan Landing, B. C.

RELATIVE ABUNDANCE OF WILD DUCKS AT DELAVAN, WISCONSIN.

BY N. HOLLISTER.

RECENTLY, in looking over some old ducking records kept by myself and companions at Delavan, Wisconsin, it occurred to me that certain parts of these records are well worthy of permanent preservation. They furnish fairly accurate data on the relative abundance of many species of wild ducks at that time and may serve for important and instructive comparisons with similar figures which may be kept at some future period. It is evident that there has been a considerable change in the relative abundance of various species during the past twenty-five years, and it would be very interesting indeed if we had comparable records for the same region for still earlier times.

From the fall of 1892 until the fall of 1899, inclusive, we occupied a cottage at Delavan Lake each autumn and spring for a week or two of duck shooting. In a book provided for the purpose, complete records were kept of every game bird brought into this cottage. All of the shooting was over decoys in open

water, the blinds being built on the shore, usually on a point extending out into the lake. For this reason the cottage gun record is essentially an open-water record of deep-water ducks. The river ducks were not commonly obtained in such places and comparatively few of them were included in the bags.

In all, 701 ducks, besides geese, snipe, and other game birds, are listed in these records, the species carefully distinguished by their local names. Unfortunately, though, the common practice of duck hunters of lumping the Greater and Lesser Scaups and the Ring-neck under the common name of 'Blue-bill,' was followed in our cottage game book. Although we recognized the three species perfectly we simply followed general custom in keeping them together in such records. From my own recollection, and I examined practically every bird recorded, as well as from a study of my personal ornithological journal covering these years, I should judge that the 270 'Blue-bills' listed in the lake records should be divided about as follows: Lesser Scaup, 60 per cent.; Ring-neck, 35 per cent.; and Greater Scaup, 5 per cent. Sometimes the Lesser Scaup was the commonest, and again, for an entire week, the Ring-neck far outnumbered the other 'Blue-bills.' I find, for instance, in my own bird journal, under general remarks covering the first two weeks of November, 1895, at Delavan Lake, the following:

> Ducks were very abundant, even older hunters say they never saw blue-bills so plentiful. The air was fairly dark with them at times; fully 500 or even 1,000 Lesser Scaups to one of any other kind. Did not see a Ring-neck during the two weeks, although this is usually a common species. There were more American Scaups [Greater Scaups] than I have ever seen before, indeed they might almost be said to be common. A few Canvas-backs, Red-heads, Butter-balls, Hooded Mergansers, Golden-eyes, Red-breasted and American Mergansers, Green-wings, Mallards, and Pintails. Canada and Snow Geese common, especially the first; a few Swans also.

Records for a number of successive years must therefore be kept to give any reasonably accurate figures on the relative abundance of the species. Almost every season is exceptional as regards some particular species; either some kind is unusually abundant or some kind is unaccountably rare.

Since these cottage records give us comparable figures only for the deep-water and so-called sea-ducks, I have carefully gone over my daily bird journals for the same eight years—1892–1899—and listed all ducks mentioned, additional to those listed at the lake cottage. These include ducks shot by myself and companions, if I was in company, and such others as were brought to me by sportsmen friends to add to my collection of local birds. These ducks, totalling in number 466, added to the records of the cottage at the lake, give us a fair average for all species and all sorts and conditions of shooting—lakes, marshes, prairie, creeks, and woodland ponds. The total figures, including 1167 ducks, may, I think, be taken as fairly representative of the place at that time. In my own journals I have usually discriminated between the Scaups and the Ring-neck, and in the following totals I have divided the 'Blue-bills' listed in the cottage gun records according to my above estimates as to their relative abundance, on the average, over the eight years period.

Below is a combined list of the 1167 ducks, arranged in the order of numbers handled, with the relative approximate abundance on basis of 100, following the method used by Mr. Aldo Leopold for the ducks of the Rio Grande Valley,[1] in the second column of figures.

RECORD OF 1167 WILD DUCKS KILLED NEAR DELAVAN, WISCONSIN, FROM 1892 TO 1899.

Species	Number recorded	Relative Abundance per 100
Lesser Scaup Duck (*Marila affinis*)	182	15.6
Hooded Merganser (*Lophodytes cucullatus*)	156	13.4
Ring-necked Duck (*Marila collaris*)	111	9.6
Mallard (*Anas platyrhynchos*)	101	8.7
Buffle-head (*Charitonetta albeola*)	96	8.2
Golden-eye (*Clangula clangula americana*)	70	6.0
Green-winged Teal (*Nettion carolinense*)	68	5.8
Wood Duck (*Aix sponsa*)	61	5.3
Blue-winged Teal (*Querquedula discors*)	49	4.2
Shoveller (*Spatula clypeata*)	36	3.1

[1] Condor, vol. 21, p, 122. May, 1919.

Canvas-back (*Marila valisineria*)	34	2.9
Pintail (*Dafila acuta*)	32	2.7
Baldpate (*Mareca americana*)	30	2.51
Redhead (*Marila americana*)	30	2.51
Red-breasted Merganser (*Mergus serrator*)	25	2.14
Greater Scaup Duck (*Marila marila*)	20	1.71
Ruddy Duck (*Erismatura jamaicensis*)	18	1.54
American Merganser (*Mergus americanus*)	13	1.11
Gadwall (*Chaulelasmus streperus*)	10	0.85
Old-squaw (*Harelda hyemalis*)	8	0.71
American Scoter (*Oidemia americana*)	6	0.49
White-winged Scoter (*Oidemia deglandi*)	4	0.34
Black Duck (*Anas rubripes*)	4	0.34
Surf Scoter (*Oidemia perspicillata*)	3	0.25
	1,167	100 per cent

In estimating the actual relative abundance of the birds, from records of this kind, allowance must be made, of course, for the size of the flocks; as mentioned by Mr. Leopold in the paper above cited. The Golden-eyes, Buffleheads, and Hooded Mergansers, for instance, commonly occur in small groups, and the proportion killed to those seen is far greater than in the case of the 'Blue-bills,' which frequently decoy in very large flocks. The ducks which habitually gather in small bunches are consequently much more rapidly reduced in numbers on an open lake than are the species that occur in great flocks.

Some of the species run about even in the records for spring and fall. With others, the Lesser Scaup and Pintail for instance, the figures for spring greatly outnumber those for autumn. If the Pintail had beeen as abundant in fall as it was in spring it would have ranked much higher in the above list. The Mallard, Teals, and Wood Duck were protected in spring in Wisconsin during all this period, and consequently were not regularly hunted at that season; so that the figures for these birds are relatively low as compared to those for some other species, like the Canvas-back, Baldpate, and Redhead, which were taken in about equal numbers during spring and fall migrations. The Hooded Merganser, Buffle-head, and Golden-eye were most commonly killed in fall, as follows:

Season	Hooded Merganser	Buffle-head	Golden-eye
Spring (1893–1899)	14	22	18
Autumn (1892–1899)	142	74	52
	156	96	70

It is doubtful if records for the present or for any future period will give anything like the above relative abundance. That the records may be equalled in numbers is entirely possible, as they are by no means large as such records go; but I do not believe that ever again will the Hooded Merganser, Buffle-head, or Golden-eye stand so near the top of such a list. These three species have suffered a greater reduction proportionally than have most of the other ducks. On the other hand, the Canvas-back and Redhead are much more common on Delavan Lake than they were during the period covered by this report; and the Black Duck, in that region, is now increasing in numbers year by year. A successful planting of wild celery in the lake accounts for the increase in the Canvas-back and Redhead; but only a general western extension in the regular distribution of the Black Duck would seem to explain the more common occurrence of that species.

Spring shooting, we all hope, has been permanently abolished, and under careful protection ducks may, on the whole, increase in numbers in North America; but certain species, if they do not actually disappear from our fauna, will undoubtedly become very rare within a comparatively short time. There must be, scattered throughout the country, many records of gun clubs, or of individual sportsmen, that might be consulted by those who have the opportunity. If the species are properly distinguished in the lists, accurate data on the former relative abundance of various species of wild ducks may be obtained from them. This exact information can be had from no other source, and in view of the still greater changes that are to be expected in the future, it will become of very great interest and value.

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