its arrival there in its first autumn, although in this instance the bird was but 20 to 30 miles from its birthplace.

Beyond this strange one-way dispersal of some individuals in their first autumn which appears to lack any definite directional trend, all that is indicated is a purely local dispersal of immatures in April, and of adults from their breeding grounds in September.

Why certain immature individuals depart from the normal behavior of their fellows in their first autumn is not clear. Eaton (*loc. cit.*), writing of Herring Gulls, suggests that "the pronounced tendency of immature birds to spend their first winter . . . [on the warm waters of the Gulf of Mexico] is a vestigial trait lost in adult birds," and this seems reasonable enough, although I am of the opinion that with these colonies of Glaucous-winged Gulls, the trait is lost when the bird reaches the terminus of its first autumn flight. Thus the bird becomes a permanent resident in the vicinity of that terminus. It is perhaps unwise as yet to attach any great significance to the movements of birds in their second or third years; for without the aid of colored bands, banding results alone are of little value in determining the movements of a bird between the date of its banding and that of its recovery. Continued efforts therefore seem necessary to band, not only nestlings, but more particularly adults, especially along the outer coast. Winter banding should give as good, if not better, results than the banding of nestlings, for birds of all ages would be taken, and there would be the chance of getting some "returns." Colored bands in this instance should give almost immediate results.

Cobble Hill, British Columbia, August 10, 1937.

A RECORD OF TWENTY-FIVE YEARS OF WILDFOWL SHOOTING ON THE SUISUN MARSH, CALIFORNIA

WITH THREE ILLUSTRATIONS

By EMERSON A. STONER

In the library of the California Academy of Sciences in San Francisco, there is a two-volume record of the birds killed at the Ibis Gun Club, Suisun Marshes, Solano County, California. Mr. M. Hall McAllister, who was for twenty-three years a member of the Ibis Club, and who donated the record above referred to to the Academy on May 1, 1921, suggested that, being a resident of the territory adjacent to the marsh, I would be interested in studying this record. Accordingly, I secured permission from Dr. F. M. MacFarland, President of the Academy, to withdraw these volumes from the library in order to make an analysis of their content. In view of the fact that the entries are carefully and seemingly accurately made, it is my opinion that they contain much that is of value for published record. The period covered is twenty-five hunting seasons, from September 15, 1882, to January 27, 1907.

Early History.—The Suisun Marshes had long been famous as wintering and feeding grounds for great quantities of wildfowl. As early as 1853, Heermann (Pac. Railroad Rept., vol. 10, part 6, no. 2, 1859, p. 67) referred to the great flocks of geese in the Suisun Valley where "as far as the eye could reach the sky was filled with flock after flock." Previous to the organization of the first shooting club, in 1879, the Suisun Marshes were held by market hunters, who shot over them for a period of about twenty years. They found a market in San Francisco and vicinity for the great quantities of birds which they were able to kill, transporting them ordinarily by boat to the metropolitan area some

forty miles distant. Among these early market hunters were Frank Horan, Bill Hayward, George Smith, Jim Judd, Bill Montgomery, Seth Beckwith and Jim Payne. The latter two hunters obtained the original leases from the Chamberlain estate and resold them to the several groups of sportsmen who organized the various early shooting clubs on these marshes.

The first shooting club on the Suisun marsh was the Hardland Club, organized in 1879 with ten members. This club was on Cordelia Slough, in the western portion of the Suisun marsh approximately one-half mile west of Cygnus, a station established for the convenience of hunters by the Southern Pacific Company whose railroad crosses the marsh for a distance of fourteen miles. The waters of Cordelia Slough served to feed the five ponds, as shown on the map of the club grounds (fig. 69). The ten charter members of the Hardland Club were Philip McShane, T. B. Wakefield, C. W. Randall, Matt Fuller, Joseph Grant, T. S. Butler, Louis Weinmann, W. W. Richards, Will Weinmann and John K. Orr.

The following year, 1880, another group of hunters took over the lease covering these Hardland ponds and named their organization the Canvasback Club. In 1882

Fig. 67. M. Hall McAllister at Ibis Club House with a limit bag of fifty Canvasbacks, 1904.

another change was made in personnel, and the name was changed from Canvasback Club to the Ibis Gun Club, which name it has carried since that year.

Name and Personnel of the Ibis Club.—The Ibis Club was so named, according to Mr. McAllister, because the White-faced Glossy Ibis was not infrequently found in that area in the early years, and also because the members felt that there was sort of a charm to this name, the ibis being a sacred bird in Egypt and some other foreign countries.

The three members of the Ibis Gun Club at the beginning of the record (in 1882) were W. P. Willard, Jack B. Wattles and C. G. Toland. Membership to the spring of 1887 remained at three, and thereafter was consistently limited to five. The register of

members for the twenty-five year period showed that the following enjoyed membership in the Ibis Club for a period of four years or over:

	Number Years of Membership	Dates of Membership
M. Hall McAllister	23	1884–1906
Harry Babcock	20	1887–1906
Charles P. Eells	12	1895–1906
James Otis	8	1899–1906
William Macdonough	7	1890–1896
E. Donohoe	6	1892–1897
George D. Boyd	6	1901–1906
C. J. Toland	5	1882–1886
R. Hochkofler	4	1887–1890

Other names registered in the books include fourteen who were members for a period of less than four years, and a number of guests. In looking over the list of non-members, it was noted that two well-known ornithologists were recorded as guests of the club on November 13, 1892. These were Joe and John Mailliard, the former securing eleven birds and the latter three. "J." Mailliard visited the club again on January 6, 1895, and shot ten birds.

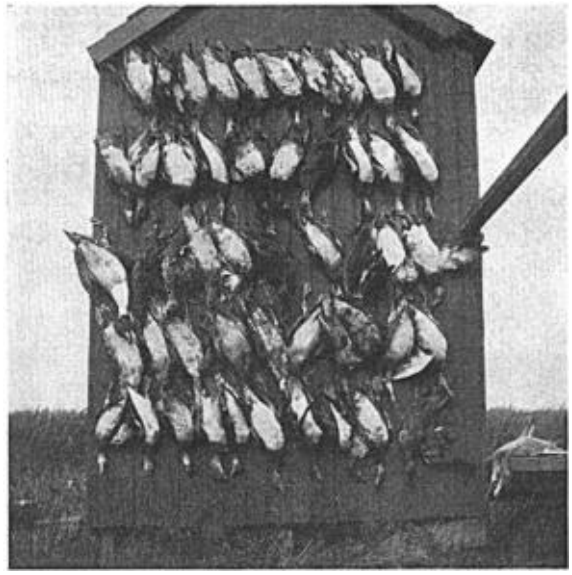

Fig. 68. Limit bag of fifty ducks killed at the Ibis Club in 1904.

Summary of Ducks Killed at the Ibis Gun Club.—My work of computing and tabulating the summary of the ducks killed was in considerable measure simplified by the fact that, at the conclusion of most of the seasons, the record showed the total of each species killed in the course of the season, the number of shoots and the average number of birds killed by each shooter in the season, and the largest daily bag for each member.

The largest single bag for a member was 154 birds, taken on October 25, 1893, by H. Babcock on Upper Surveyor Pond. His bag was 27 sprig, 8 teal and 119 widgeon. The average daily bag for each hunter per shoot was approximately twenty birds. The record shows that the limit law of not over fifty ducks per day went into effect with the

1901 season; previous to that year, there apparently was no limit as to the number of birds which might be killed.

The 36126 ducks recorded as killed at this club in the twenty-five year period were as follows.

DUCKS KILLED AT THE IBIS GUN CLUB, SOLANO COUNTY, CALIFORNIA, 1882 TO 1907

		Percentage
Sprig	10807	29.9
Widgeon	9920	27.5
Canvas-back	6981	19.3
Teal	3415	9.5
Mallard	2094	5.8
Spoonbill	1209	3.3
Black-jack (Scaup)	722	2.0
Ruddy	589	1.6
Gadwall	200	.6
Buffle-head	113	.3
Red-head	62	.2
Golden-eye	8	—
Merganser	6	—
	36126	100.0

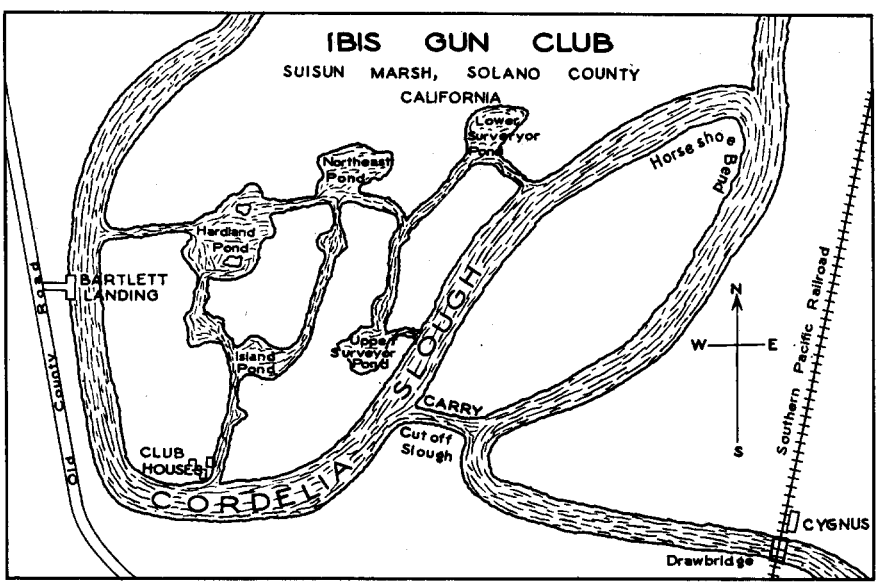

Fig. 69. Map of Ibis Gun Club, redrawn from map made by M. Hall McAllister in 1888.

A comparison of the above percentages with a similar percentage summary made by the writer (Condor, vol. 36, 1934, pp. 105–107) of a total of 20844 ducks killed on the adjacent Tule-Belle Club is of interest. The Tule-Belle Club was across the Cordelia Slough, south and east of the Ibis Club. The two records show approximately a 12 per cent larger kill of Canvas-back at the Ibis Club than at the Tule-Belle. Teal topped the Tule-Belle Club list with 30.5 per cent of the total birds killed, while only 9.5 per cent of the ducks killed by the Ibis Club were teal. Concerning these two major differences, McAllister explains in a letter to me that "the Ibis had deep-water ponds three to four feet deep, reaching to my arm pits, while the Tule-Belle had shallow water and puddle

holes one to two feet deep." The preference of Green-winged Teal for shallow water and of Canvas-backs for deep water is well known. Bent (U. S. Nat. Mus. Bull., no. 126, 1923, p. 106) says of the Green-winged Teal, "it loves to dabble in the shallow water about the edges of the sloughs, ponds, and creeks," whereas (p. 197) "the canvasback can dive to great depths and is said to be able to obtain its food at a depth of from 20 to 25 feet."

Combining the two tabulations, a "census" of 56970 birds killed at the Ibis and Tule-Belle clubs, one involving shallow ponds and the other deep-water ponds, is available. This larger figure might serve as a more satisfactory and more nearly accurate basis on which to summarize the relative abundance of waterfowl which winter on the Suisun marsh.

SUMMARY OF DUCKS KILLED AT THE IBIS AND TULE-BELLE CLUBS

	Ibis (deep water)		Tule-Belle (shallow water)		Combined (deep and shallow water)	
	Number	Per cent	Number	Per cent	Number	Per cent
Sprig	10807	29.9	5107	24.5	15914	27.9
Widgeon	9920	27.5	4153	20.0	14073	24.7
Teal	3415	9.5	6347	30.5	9762	17.1
Canvas-back	6981	19.3	1508	7.2	8489	14.9
Spoonbill	1209	3.3	1859	8.9	3068	5.4
Mallard	2094	5.8	701	3.4	2795	4.9
Black-jack	722	2.0	641	3.0	1363	2.4
Ruddy	589	1.6	8	—	597	1.1
Buffle-head	113	.3	373	1.8	486	.9
Gadwall	200	.6	104	.5	304	.5
Red-head	62	.2	9	.2	71	.2
Wood Duck	—		24		24	
Golden-eye	8		4		12	
Merganser	6		6		12	
	36126	100.0	20844	100.0	56970	100.0

Fall Migration Dates.—The opening dates of the hunting season at the Ibis Club varied from September 9 (1889) to October 1 for eighteen seasons; in the remaining seven seasons the first shooting date was October 15. The season closed at varying dates between January 4 (1884) and March 3 (1888).

It seemed to be with a feeling of pride that a member recorded the first Canvas-back (*Nyroca valisineria*) bagged in the fall. This was accomplished usually by blocking in ink the number killed, usually a single bird, and marking the entry "first can." The earliest fall date for the taking of this species in the twenty-five year period was October 6 (1889), and the latest first appearance on the records was November 2 (1891). The average fall date for the first Canvas-back was October 25.

Cinnamon Teal (*Querquedula cyanoptera*), though usually recorded in the same column with Green-winged Teal (*Nettion carolinense*), were customarily marked "Cinnamon." The Cinnamon Teal is known to be a summer resident and an early fall migrant on these marshes. However, it was not uncommon to find birds wintering on the marsh, as on December 7, 1884, December 19, 1885, December 21, 1890, January 8, 1905, and January 25, 1891.

The earliest fall record for the Buffle-head (*Charitonetta albeola*) was October 18 (1903); and the earliest "Black-jack" (Scaup) was killed on October 5 (1899).

Gadwalls (*Chaulelasmus streperus*) were on hand on several of the first shooting days, September 9, September 15 and other September dates. A hunt on September 9, 1899, showed that already there were six species of ducks on the marsh. McAllister bagged on that date Mallard (*Anas platyrhynchos*), Sprig (*Dafila acuta*), Widgeon (*Mareca americana*), Gadwall, and Green-winged and Cinnamon teal.

The Snow Goose (subspecies not named but probably most frequently the Lesser Snow Goose, *Chen hyperborea hyperborea*) was first killed in the fall as early as October 25 (1888 and 1903), and October 26 (1898), though more often first taken in November. Four hundred and eighty-eight Snow Geese, 73 "grey geese" (*Anser*), and 34 "honkers" (*Branta*) were killed in the period covered.

Fifty-one swans were recorded. The earliest fall swan was one killed November 8 (1888). In view of the rather limited amount of data recorded in the literature on swans in the San Francisco Bay region, the full record on this species is included in this report. The data on "weather," when shown, are included with November records. It is noted that Grinnell and Wythe (Pac. Coast Avif. no. 18, 1927, p. 59) record for the Whistling Swan in the Bay region: "Earliest date . . . , seasonally, is December 7 (Tomales Bay)." There are eight November swans recorded in the Ibis Club records.

DATES ON WHICH SWANS WERE KILLED AT THE IBIS GUN CLUB

December 10, 1882	2		November 17, 1889	3	(cloudy and rain)
December 19, 1883	1		December 1, 1889	1	
December 23, 1883	1		November 30, 1891	1	(18 pounds)
January 28, 1884	1		December 20, 1891	2	
February 3, 1884	1		December 27, 1891	3	(1 12 pounds, 1 14 pounds)
November 25, 1885	1	(rain 4 days, water very high)	December 30, 1891	1	
November 23, 1887	3	(bright and cool)	January 1, 1892	2	
December 11, 1887	2		January 10, 1892	2	
December 13, 1887	1		January 17, 1892	1	(20 pounds)
December 18, 1887	2		December 1, 1895	1	
December 21, 1887	1		January 11, 1896	1	
December 25, 1887	1		January 20, 1898	1	
December 26, 1887	1		January 21, 1898	1	
December 28, 1887	1	(17 pounds)	November 26, 1902	1	(fog)
December 29, 1887	1		November 30, 1902	1	(clear)
November 8, 1888	1	(clear and warm)	December 7, 1902	1	
November 11, 1888	2	(wind in morning, clear and still after 10)	December 2, 1903	1	
			December 27, 1903	1	
January 10, 1889	2		December 31, 1905	1	

Miscellaneous Data.—Mr. McAllister advises me by correspondence that the White-faced Glossy Ibis (*Plegadis guarauna*) was known as "black curlew" by hunters on the Ibis Gun Club. In 1889, September 15, he shot one of these from a flock of about a dozen.

A rather odd popular name appearing in the books is "skenk-doo," a specimen of which is recorded as shot by McAllister on Hardland pond on November 20, 1888. In reply to my inquiry, he advises me that "skenk-doo" was the popular name in these marshes for the American Bittern (*Botaurus lentiginosus*).

Yellow-legs, willets, killdeer, robin snipe, larks, blue heron and a pelican were listed as taken, but no attempt has been made to analyze these records and I have omitted such entries from the total figures. Occasionally a mammal is listed as having been killed: several rabbits and coons, an otter and a mink.

On the back fly leaf of volume one of the records are recorded the goose calls used by "Doc" Stuart, Abe Krump and Claude Kagee at Maine Prairie, Solano County, a little northeast of the Suisun marsh. These three men were recognized as among the best goose callers in the country (McAllister, Calif. Fish and Game, vol. 15, 1929, pp. 215–218). The term "brant" included both the Cackling Goose and Hutchins Goose, the former being known as the "little brant" or "cackler," and the latter as "Mexicans" or "large brant." The calls used were as follows:

Brant—*t'lick—t'lick—t'lick*—high key, sharp, not too fast at beginning, but ending in a quick roll.

White-fronted—*tad-lick—tad-lick—tad-lick—lick—lick—lick* (idem)

Snow Goose—*cwaw—caw-qua—cwaw*—repeated

"China Goose" or Ross Goose—calls like Brant—*t'lick—t'lick—t'lick*

In 1907 the Chamberlain tract comprising 5,000 acres of the Suisun marsh was sold for $20.00 per acre, or a total of $100,000.00, to Frank Maskey *et al.*, and all of the clubs were closed. It so happened that two of the three purchasers did not get a chance to fire a shot. Charley Fair was killed in July, 1907, in an automobile accident, and Joe Harvey died of pneumonia in September of the same year. After their deaths, the tract was divided up again, and four of the men who were members of the Ibis Club for the 1906 season (McAllister, Babcock, Eells and Otis) became members of the Cordelia Shooting Club.

Benicia, California, August 1, 1937.

BIOTIC ASSOCIATIONS AND LIFE-ZONES IN RELATION TO THE PLEISTOCENE BIRDS OF CALIFORNIA

By ALDEN H. MILLER

Life-zones in California are today fairly well recognized distributional divisions into which land plants and animals may be grouped. The zonal classification of a biota is inevitably subject to criticism because each organic species presents a separate problem in distribution; each responds to the numerous physical and biotic factors in different manner so that a given aggregation of species can not be bounded by any single factor or even simple group of factors of the environment. For this reason associations of plants and animals within broad zonal categories rightly receive attention as more precisely classifying the requirements and environment of species. Ultimately it is the ecologic niche, with all that that term implies in the way of significant life associates, which classifies the species biotically to the finest degree.

These familiar concepts of distribution constitute an absorbing problem when an attempt is made to apply them to conditions in the past. Our curiosity concerning the appearance of the country in former ages is one of the main reasons for study of the fossil record.

How is it feasible to piece together information bearing on this problem from fossils? The line of reasoning is as follows: (1) If in a fossil fauna the same species as live today occur, they must have required similar environmental conditions; (2) these species may have had associates that were the same, or that were similarly adapted, to those they now have; if they were known to have had a few associates like the present ones, we can assume that conditions were closely similar; (3) several associational groups along with indicator species point to a life-zone of a particular type; these also suggest the type of climate.

Several portrayals of conditions in the vicinities of the Rancho La Brea, McKittrick, and Carpinteria asphalt deposits have been offered. The excuse for another rendition of the picture of these most important Pleistocene localities is not any new method of approach, but only that more evidence has accumulated which needs to be fitted into our knowledge of the whole situation. Also, the comparison of the three faunas has not been fully developed.

Rather belatedly in the history of research on the asphalt deposits are complete studies of land birds of smaller types, and of the plants. These two elements of the biota, more than other elements thus far studied, reflect the precise environmental conditions.