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THE JANUARY 1977 AVIAN CHOLERA EPORNITIC IN NORTHWEST CALIFORNIA

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Abstract: A total of 844 birds were observed dead at three sites in Humboldt County and an estimated 6750 birds died at three sites in Del Norte County, California. Coots were the primary species affected. The isolation of *Pasteurella multocida* from a snowy egret *(Egretta thula)* is the first reported case of avian cholera in this bird. There was evidence for a distinct sequence in the bird species dying at one site; American coots *(Fulica americana)* appeared to be the first species to die.

INTRODUCTION

Avian cholera has been endemic to Texas and northern California since the winter of 1943-44.[6] More recent outbreaks in a variety of other sites [1,3,4,5,6,8] suggest that the disease may be spreading. The disease has occurred irregularly in Humboldt County, California, since the first recorded outbreak in 1957 at the Centerville Gun Club on the Eel River bottoms.[2] *Pasteurella multocida* was isolated from birds dying at six sites in northwest California in January, 1977. The number and species of birds involved, and unique characteristics of this outbreak are described.

MATERIALS AND METHODS

Eight sites in Humboldt and Del Norte Counties, California, were monitored for waterfowl die-offs: Centerville Gun Club, City of Arcata Oxidation Ponds, McBride Ranch, Big Lagoon and Freshwater Lagoon in Humboldt County; and Lake Earl, Lake Talawa and McLaughlin Pond in Del Norte County. Centerville Gun Club, Arcata Oxidation Ponds and McBride Ranch have been described previously.[2]

Big Lagoon is approximately 35 km north of Arcata and Freshwater Lagoon is about 45 km north of Arcata, both in Humboldt County. Both are coastal lagoons, with very little aquatic vegetation, used primarily as resting and feeding areas for migratory waterfowl.

Lakes Earl and Talawa together with McLaughlin Pond are located about 8 km north of Crescent City, in Del Norte County. They serve primarily as wintering sites for many species of waterfowl.

Complete counts were taken of dead birds at all Humboldt County sites and at McLaughlin Pond in Del Norte County. Partial counts were made of the dead birds on Lakes Earl and Talawa and the total mortality estimated at these two sites.

Five live population estimates were made between 14 January and 7 February at the Centerville Gun Club. Data obtained from an aerial survey made by the U.S. Fish and Wildlife Service of Lake Earl and Lake Talawa in Del Norte County on 11 January were used to estimate the live population for these sites.

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RESULTS

A total of 844 birds were observed dead in two areas of the Centerville Gun Club (Table 1). The first evidence of mortality was 29 December 1976 (F. Telonicher, Centerville Gun Club, 1977 pers. comm.). No fresh carcasses were found after 7 February 1977.

An estimated 6750 migratory birds died at three sites in Del Norte County; the carcasses that were collected and identified are given in Table 2. The dates of onset and termination of mortality are unknown, but they are believed to be similar to those reported for Centerville. This is the first reported avian cholera outbreak in Del Norte County. The isolation of *P. multocida* from a snowy egret *(Egretta thula)* at Lake Talawa is believed to be the first report of avian cholera from this species.

P. multocida was isolated from one ruddy duck *(Oxyura jamaicensis)* collected at the Arcata Oxidation Ponds as well as one ruddy duck from Big Lagoon. This is the first reported case of avian cholera from Big Lagoon.

Of 26 birds (11 coots, 5 ruddy ducks, 2 shovelers, 4 whistling swans and 4 widgeon) from these areas that were examined at necropsy, 18 had petechial hemorrhages on the myocardium, 11 had signs of hemmorrhage in the intestinal tract, 7 had white, pin-point foci on the liver, and one had a nasal discharge.

DISCUSSION

There was evidence of disproportionate mortality. At Centerville, coots composed approximately 80% of the mortality but only an estimated 45% of the live population. In contrast, American green-winged teal composed an estimated 21% of the live population but less than 1% of the total mortality (Table 1).

Coots made up 74% of the total mortality at Lake Talawa, but less than 45% at the other two Del Norte County sites (Table 2). The aerial survey data in Del Norte County indicated that approximately 33% of the live waterfowl population was composed of coots. Pintails made up an estimated 41% of the live population in Del Norte County, but comprised only 3% to 12% of the dead birds. The reasons for these discrepancies are not clear.

There were distinct differences in the geographic distribution of this outbreak compared to the 1975-76 avian cholera epornitic. The 1975-76 epornitic occurred at Centerville, the McBride Ranch and the Arcata Oxidation Pond. In addition to Centerville, the January 1977 outbreak occurred at three sites in Del Norte County; no mortality occurred at the McBride Ranch and only one bird died of avian cholera at the oxidation ponds.

The mortality data at the well of the Centerville Gun Club was further analyzed to determine if there were significant differences in the time of death for the various species during the outbreak. For each bird species, the proportion of the total mortality that occurred before 11 January was determined. Thus, for example, 94% of all the coots dying at the well died before 11 January (Table 3). Using a Log Liklihood Ratio Test (G test for heterogeneity)[7] on these data, it was found that a significantly ($p<0.05$) greater proportion of coots died before 11 January 1977, compared to pintails (63%), shovelers (40%) and mallards (0%) (Table 3). Further, significantly fewer mallards (0%) died before 11 January compared to coots, widgeons (92%), gadwalls (86%) and swans (75%). Thus, the birds did not appear to die with the same frequency or at the same time during the outbreak; rather there was evidence for a distinct sequence of mortality among the species affected. The available data suggest that coots were the first species to die. Coots have been reported as the first or only species to die in other outbreaks,[3,5] including Grizzly Island, California in January, 1952 (L.N. Locke, 1977, pers. comm.).

TABLE 1. Species composition of dead and live birds at the Centerville Gun Club, Humboldt County, California during the Jan. 1977 avian cholera outbreak.

	Dead Population						Live Population[a]		
	Hunter Ponds		Artesian Well		Total				
Species	#	%	#	%	#	%	%	Mean	S.E.
American coot *(Fulica americana)*	200	70.4	478	85.3	678	80.4	44.5	410	108
Whistling swan *(Olor columbianus)*	51	17.9	32	5.7	83	9.8	7.3	67	46
Pintail *(Anas acuta)*	20	7.0	16	2.8	36	4.3	15.3	141	30
American widgeon *(A. americana)*	3	1.1	13	2.3	16	1.9	2.7	25	16
Northern shoveler *(A. clypeata)*	5	1.8	5	0.9	10	1.2	3.2	30	14
Mallard *(A. platyrhynchos)*	4	1.4	5	0.9	9	1.1	4.3	40	18
Gadwall *(A. strepera)*	0	0	7	1.3	7	0.8	0	0	—
American green-winged teal *(A. crecca carolinensis)*	1	0.4	0	0	1	0.1	21.3	196	78
Others	0	0	4	0.8	4	0.8	1.4	13	3.2
Totals	284	100.0	560	100.0	844	100.0	100.0	922	—

[a]Total counts made on 14, 21, 28 Jan. and 1, 7 Feb. 1977.

TABLE 2. Species composition of dead birds at three sites in Del Norte County, California during the 1976-1977 avian cholera outbreak, compared to live population estimated to be present.

	Lake Talawa		Lake Earl		McLaughlin Pond		Est. Live Pop. [b]	
Species	# Dead	% Mortality	# Dead	% Mortality	# Dead	% Mortality	%	Number
American coot	2728	74	211	37	162	43	33	1540
American widgeon	287	8	63	11	107	29	16	750
Pintail	131	3	68	12	10	3	41	1870
Others	567	15	227	40	94	25	10	475
	3713[a]	100	569[a]	100	373[a]	100	100	4635

[a]Mortality counts are complete for McLaughlin Pond but are only partial for Lake Talawa and Lake Earl.

[b]Based on an aerial survey conducted 11 January 1977 by the U.S. Fish and Wildlife Service.
The estimated live populations are sometimes lower than the reported dead populations because the mortality was measured over the season whereas the live birds were counted on one day only.

TABLE 3. Proportion of the total mortality for each species that occurred prior to 11 January 1977 during the 1976-77 avian cholera outbreak at the well, Centerville Gun Club, Humboldt County, California.*

American coot	American widgeon	Gadwall	Whistling swan	Pintail	Northern shoveler	Mallard
0.94	0.92	0.86	0.75	0.63	0.40	0.00

*The proportions of the species underlined with the same line were not significantly ($p<0.05$) different, using the Log Liklihood Simultaneous Test Procedure (G test for heterogeneity).

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