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Source: Journal of Wildlife Diseases, 14(2) : 229-232

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-14.2.229>

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THE 1975-76 AVIAN CHOLERA OUTBREAKS IN HUMBOLDT COUNTY, CALIFORNIA

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Abstract: The 1975-1976 avian cholera outbreaks were observed from 25 November 1975 to 17 February 1976 at three sites in Humboldt County, California. This is the first known occurrence of avian cholera on one of the sites (City of Arcata Oxidation Ponds).

INTRODUCTION

Avian cholera is endemic to northern California and Texas.¹ Sporadic outbreaks have occurred in other areas,^{1,2,3,4} indicating the disease may be spreading. Avian cholera has occurred irregularly in Humboldt County, California. The first confirmed outbreak occurred in January, 1957, at the Centerville Gun Club on the Eel River bottoms (G. Monroe, Calif. Dept. Fish & Game, pers. comm. 1976). Since 1957, outbreaks have been recorded there as well as on the McBride Ranch on the southern shore of Humboldt Bay during the winters of 1960-1961, 1970-1971 and 1971-1972. This is the first published account of an avian cholera outbreak for Humboldt County.

METHODS

The two sites with previous avian cholera mortality in Humboldt County, the Centerville Gun Club (Sec 32, T3N, R2W) and the McBride Ranch (Sec 32, T4N, R1W) are periodically flooded agricultural lands. Two shallow ponds, approximately 2.2 and 3.9 ha in size, respectively, flooded by the gun club during each waterfowl hunting season, were studied at Centerville. The fields around Hookton Slough were studied on the McBride Ranch.

A third site was the City of Arcata Oxidation Pond (Sec 5, T5N, R1E). This pond is part of the city's sewage treatment facility and is located along the

northern edge of Humboldt Bay. The pond is approximately 22 hectares in size and has little shoreline vegetation. It is at the edge of large mudflats used by many species of shorebirds and waterfowl. Large increases in waterfowl populations on the pond occur during the hunting season as birds seek refuge from the hunting pressure on Humboldt Bay.

Daily counts of the estimated live population on the oxidation pond as well as a total count of dead birds on all three sites were made during the outbreaks. Twenty ducks and 11 coots (*Fulica americana*) were examined at necropsy to determine the types of lesions present. In addition, heart blood, bone marrow and brain were sampled from three coots, two whistling swans (*Cygnus columbianus*) and three ducks in an effort to isolate *Pasteurella multocida* from the carcasses. L.D.₅₀ values were determined in 17-20 g. white mice and live-trapped *Peromyscus maniculatus*.

RESULTS

Outbreaks of avian cholera occurred from 29 November 1975 to mid-January, 1976 on the Centerville Gun Club, and from early January to early February on the McBride Ranch. Two were observed at the oxidation ponds, the first from 1-18 January and the second from 6-17 February 1976. The number and distribution of bird carcasses found are summarized in Tables 1 and 2. The species

TABLE 1. Species composition of birds dying during the 1-18 January and 6-17 February 1976 outbreaks at the Arcata Oxidation Pond compared to the live population.

Species	# Dead	% Mortality	% Live Population	# Live Population*
Ruddy Duck (<i>Oxyura jamaicensis</i>)	358	62.3	33.8	491
Shoveler (<i>Spatula clypeata</i>)	97	16.8	29.8	432
Coot (<i>Fulica americana</i>)	23	4.0	10.6	153
Bufflehead (<i>Bucephala albeola</i>)	31	5.4	9.9	144
Scaup (<i>Aythya marila</i> and <i>A. affinis</i>)	13	2.3	1.9	27
Grebes	9 ^a	1.6	2.3	34
Gulls	7 ^b	1.2	—	—
Canvasback (<i>Aythya valisineria</i>)	3	0.5	10.5	153
Others	33 ^c	5.9	1.2	16
	574	100.0	100.0	1448

*Mean daily live population estimates from 10-18 January and 6-17 February, 1976.

^a7 eared grebes (*Podiceps caspicus*), 1 western grebe (*Aechmophorus occidentalis*), and 1 unidentified grebe

^b4 western gulls (*Larus occidentalis*), 2 Bonaparte's gulls (*Larus philadelphia*) and 1 glaucous-winged gull (*Larus glaucescens*)

^c3 pintails (*Anas acuta*), 2 green-winged teal (*Anas carolinensis*), 2 ring-necked ducks (*Aythya collaris*), 1 Am. widgeon (*Anas americana*), and 25 unidentified birds

composition of dead birds as well as the live population at the oxidation ponds were virtually identical for both outbreaks; thus the information for both is combined in Table 2. From 1-18 January, 429 carcasses were collected, and 145 birds were found during the 6-17 February outbreak.

Two of the 31 birds from the Centerville Gun Club and oxidation pond appeared to have died of gun-shot wounds. Gross lesions indicated the other 29 birds died of avian cholera. Twenty-three (79%) of the 29 birds had focal necrosis on the liver and 15 (52%) had petechial hemorrhages on the epicardial fat or myocardium.

P. multocida was isolated from three coots, two whistling swans and two ruddy ducks (*Oxyura jamaicensis*) from these sites.⁷ L.D.₅₀ values ranged from 10^{7.3} to 10^{7.8} in both the laboratory mice and *P. maniculatus*.

DISCUSSION

Ruddy ducks comprised 33% of the live population at the oxidation ponds. Since they represented 62% of the total deaths, these birds suffered a higher frequency of mortality compared to other species. Populations of *P. multocida* are known to occur in water during avian cholera

outbreaks.¹ As a matter of speculation, it was noted that the ruddy ducks appeared to spend most of their time on the ponds, whereas the other species left the ponds regularly. Thus they may have had a greater exposure to bacteria in the water. The high mortality among coots at the McBride Ranch and Centerville might be related to the good quality habitat of these partially flooded fields which, in

turn, attracted these birds to these infected sites.

It is also interesting to note that the Centerville Gun Club is the only site on which avian cholera has occurred in every year that it has been reported in the county. To the extent records are available, outbreaks always have been reported from this site before appearing at any other site in an avian cholera year.

TABLE 2. Species composition of birds found dead on two ponds of the Centerville Gun Club, January 10, 1976, and the McBride Ranch, February 6, 1976.

Species	Centerville Gun Club		McBride Ranch	
	# Dead	% Mortality	# Dead	% Mortality
Coot	1868	92.8	165	97.0
Whistling Swan (<i>Cygnus columbianus</i>)	14	0.7	2	1.2
Widgeon	40	2.0	—	—
Pintail	60	3.0	—	—
Shoveler	11	0.5	—	—
Green-winged Teal	7	0.3	—	—
Gulls	4 ^a	0.2	2	1.2
Others	10 ^b	0.5	1	0.6
	2014	100.0	170	100.0

^a4 western gulls

^b3 mallards (*Anas platyrhynchos*), 1 canvasback, 1 least sandpiper (*Erolia minutilla*) and 5 unidentified birds.

^c1 western gull and 1 glaucous-winged gull

^d1 great blue heron (*Ardea herodias*)

Acknowledgements

The authors wish to thank Wayne Bienkowski, Larry Bollman, David Consoli, Carolyn Kruger, Rance Morrison, Dana Page, Kevin Romanolo, Dan Stewardson, James Villegas and Keith Wittenhagen for help in various parts of this study.

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Received for publication 10 March 1977
