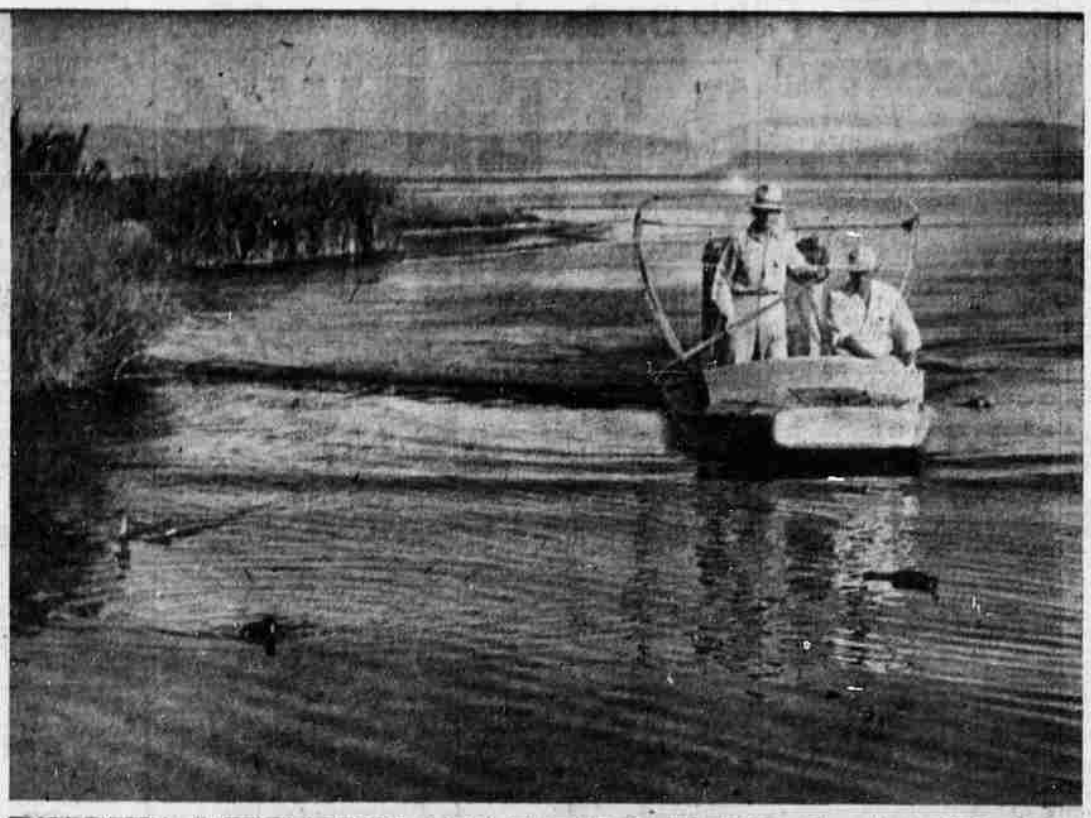
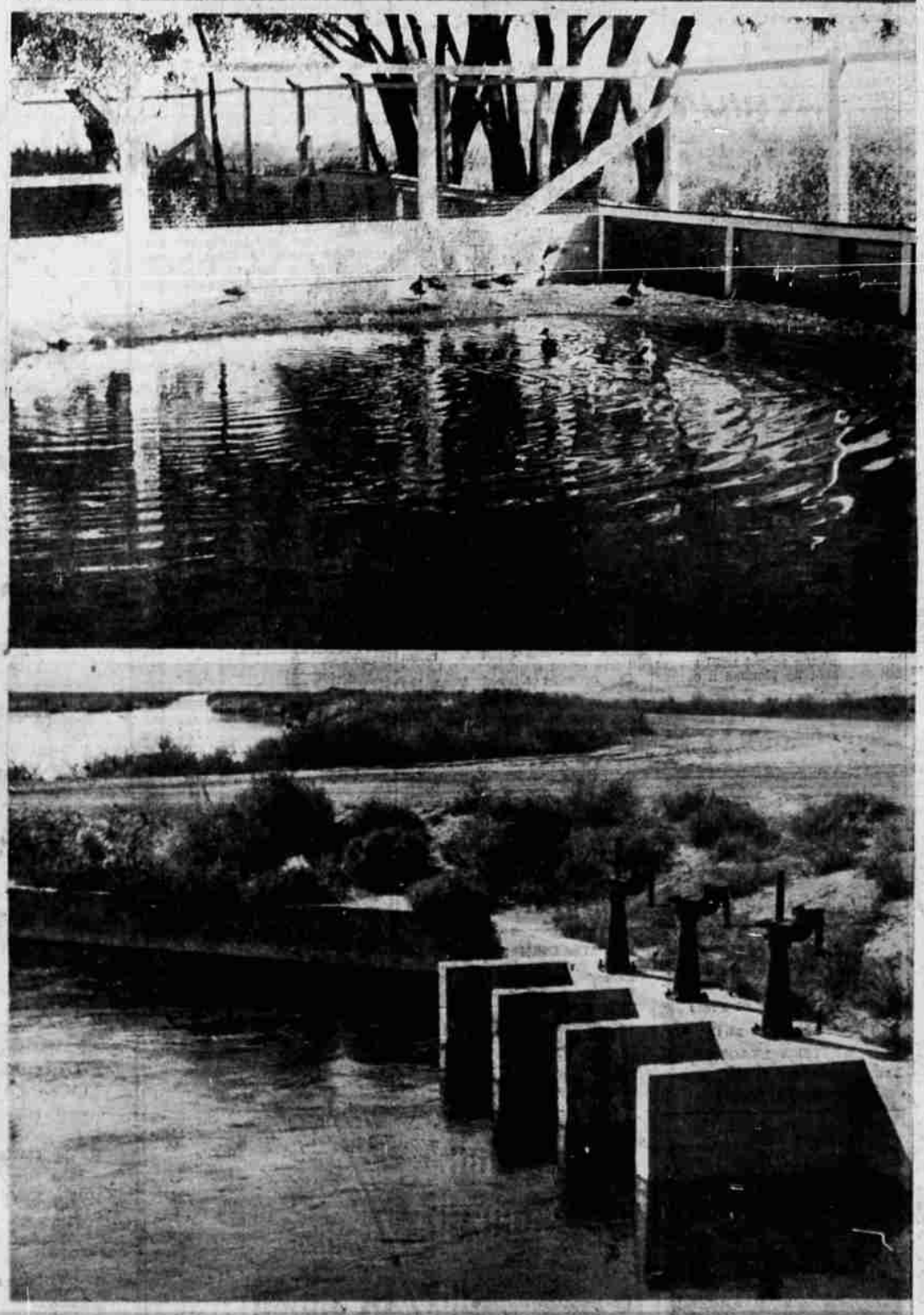
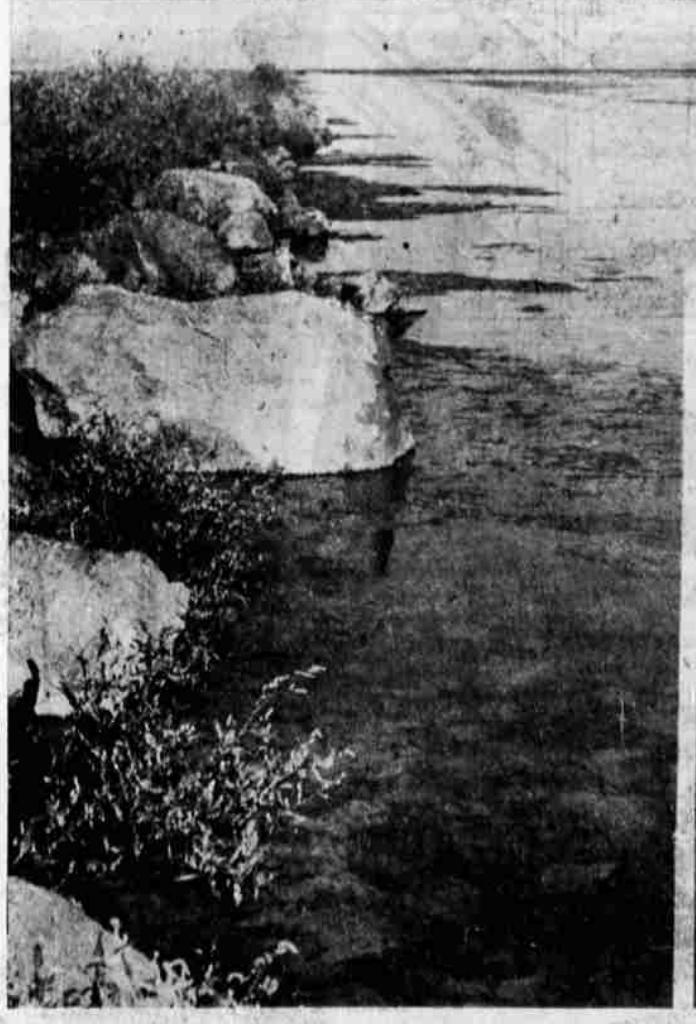
Fight Against Botulism Gains Ground on Tule Refuges







HOSPITALIZED bird is treated with anti-botulism vaccine (top left) by Jerry Watson, U.S. Fish and Wildlife biologist. Center left, Asst. Refuge Mgr. Jean Branson checks botulism - infected duck in "ward" cage. Bottom left, straight-line banks eliminate feather edges on Lower Klamath refuge and thus cut down botulism. Top right, refuge men gather infected ducks from water, and picture below that shows recuperating ducks in duck hospital pond. Control gates are important feature in botulism control since steadily declining water level will keep birds away from botulism-infection areas like that at bottom, right, where water is very shallow and bacteria producing the poison develop.

BY MALCOLM EPLEY

Probably ever since there have been ducks and geese there has been botulism poisoning, and certainly it is as old as the history of the West, since it has been recorded almost since the first white men crossed the Great Divide.

Early records, according to Tule Lake Wild Life Refuge Mgr. Tom Horn, show the poisoning was prevelant through the West early in the 1800's. Records showing it were made in Alberta and Saskatchewan in Canada, and Montana, Utah, Nevada, Oregon and California.

Fremont found it in 1842 and 1844 in Southern Oregon and California. Evidence of it was found in the Tulare Valley in 1852 and in the San Joaquin Valley in 1880. Other evidence showed it in Utah and Nevada between 1871 and 1874.

"Conditions haven't changed," Horn says. "We still have it."

Botulism, he explains, is caused by a toxin (poison) which is a product of the action of a bacteria called Botulimum clostridium on animal or vegetable matter. The bacteria itself is not poisonous, but its actions are.

This toxin, Horn explains, has an extremely high lethal level as compared with most other poisons. It is not selective to waterfowl, but will affect any animal (including humans) which ingest it. The toxin itself has never been isolated, but some of its characteristics are known.

How botulism poisoning is formed is a question with many answers.

"The combinations of conditions promoting it are unlimited," Horn says. "Ideal for production is lack of oxygen and total darkness. The bacteria will die if exposed to light and air. An alkaline condition is considered a pre-requisite for bacteria production, although sometimes it looks as though vegetable matter does the trick. Warm weather is necessary for bacteria production."

The last necessary item necessary for botulism in ducks is a duck.

"All you've got to do to prevent the poisoning," Horn explains, "is add oxygen or sunlight, keep water acidious, remove all animal or vegetable matter, and keep the area cool. That way the ducks wouldn't become poisoned."

It sounds easy, but Horn is quick to point out that it is taking lots of construction and water management to attain the degree of condition where the poison will have no effect.

The way these lethal conditions are reached on the Lower Klamath and Tulelake areas is simple. Horn explains it this way:

A reasonably large area of water of zero depth on one side and three inches of the, say, southwest side. In the Klamath Basin this water will be alkaline. Waterfowl and muskrats feeding on aquatic plants will pull many up and let them drift free. Weeds will blow into the area. Large mats of filamentous algae which grow in ponds is also free drift.

With all of this drifting free, a north wind pushes it into a small area where it mats over so thickly that wave action won't penetrate. Sunlight is excluded from the bottom of the mat, and the hot summer sun (usually August and September) begins a decaying process. This uses up oxygen, and hundreds of thousands of tiny aquatic animals suffocate and die.

Thus, Horn shows, we have the stage set for a first class production of botulism toxin.

The bacteria are prevelant in soil everywhere, but here they can come out of spore and start to work. Here the toxin is produced.

With anywhere from 100,000 to 1,000,000 (M) birds on the refuges at one time, Horn notes that anytime one square foot of area begins toxin production, botulism in waterfowl is here.

When the poisoning strikes, its victims are overcome by a progressive paralysis. First of all is the nictating membrane (on birds an eyelid closing from bottom to top), which cannot be closed and in stages of infection leads to the blinding of the bird.

Then birds lose power of flight, with wing muscles paralyzed. The birds' use of legs goes next and the fowl must lie motionless on the water or drift with the wind. Finally the neck muscles become affected, and will oftentimes drown because the bird cannot hold its head up.

To treat stricken birds, the Fish and Wild Life Service has established a "botulism." Birds are picked up in infested areas, brought to the hospital and first have eyes washed out with boric acid. A two-cubic centimeter injection of anti-toxin is shot into the bird with a hypodermic needle, under the skin of the abdomen.

Because throat muscles are generally paralyzed and the bird cannot drink, about one and a half ounces of water is injected in the bird through a long rubber tube inserted in the bird's crop. The birds are then put in shaded pens with clear running water and after about 24 hours are usually on their feet and are released to ponds from which they fly to freedom.

Of 100 birds hospitalized, 82 normally recover. The total operation costs about 25 cents per bird.

Research, the refuge manager says, has long since pointed the way to botulism control, at least partially, by construction work and control of water levels. That research was instigated in 1914, and in 1929 a field laboratory was established at Klamath Falls with scientists present from the Fish and Wildlife, Bureau of Animal Husbandry and other agencies. The studies continued for two years, and it was here that it was discovered the bacteria were responsible for the production of the botulism poisons.

That bacteria is found everywhere on earth.

Since the poisoning is generally associated with shallow water and "feather edges" where dense vegetable mats can form, elimination of those conditions has shown great curtailment of waterfowl losses. Since Tule Lake's entire water area has been diked, there is much less loss then when its natural slope made the shoreline.

Sometimes, Horn notes, it is impossible to eliminate feather edges during critical periods—July, August and September. But by maintaining a slow but constant water-level decline, the vegetable blankets are left high and dry, and away from the watered areas where the ducks dabble.