CARP CONTROL ON MONTEZUMA REFUGE

Introduction

During the past few years the two pools at Montezuma Refuge have become heavily infested with carp. These fish enter the pools over the tops of spillways, through equalizers and occassionally over the dikes at the time of spring floods. Then three successful spawning seasons populated the pools with carp to the point where stringent control measures were imperative. These undesirable fish had destroyed a large proportion of the natural and planted aquatics. At the same time they kept the water so turbid that the sunlight necessary for the germination of seed for new plant life was excluded. With their food supply so depleted, waterfowl usage of refuge pools has declined,-- more so in the past year.

For the last three years free use permits for seining carp from refuge pools and spillways have been issued. Despite annual removals of ten to twenty tons of carp, the fish increased in abundance. It was evident that more effective means of control were necessary.

In early August, 1952 it was decidéd that the storage pool would be drained and the channels and potholes remaining after drainage would be treated with rotenone.

Methods and Procedures

Before draining the pool the project was discussed with officials of the New York State Conservation Department. This agency

was very interested in the idea because they had a carp problem similar to ours at their Oak Orchard Refuge eighty miles west of Montezuma. Also it was deemed advisable to remove as many game fish as possible from the pool before treating it with rotenone,--these fish to be transplanted to waters open to fishing. A state crew was detailed to this operation but after several days of seining it was found that the number of game fish in the pool was negligable. A number of stunted bullheads were present but they were not worht sorting out of the young carp for removal to other waters.

The first step was to drain sufficient water from the storage pool to the main pool to bring the latter up to recommended maximum level. This would have required about three days. However, just at the time the decision was reached, the contractor closed in his dikes cutting off the greater main pool area from the corner in which the supply culvert is located. It was several days before he could install temporary culverts to equalize the two sections of the main pool. Therefore the final transfer of water from the storage pool to the main pool (which served in part to drain the former) was not started until August 22. Meanwhile the connecting spillway had been opened for two days (Aug. 18-20); that filled the small northwest section of the main pool cut off by the throughway and the excess flowed out over May's Point spillway. This first operation lowered the pool .54 feet to a reading of 384.04 on the gauge (recommended maximum is 385.00).

On August 25 the main pool had been filled; White Brook and Black Brook spillways were opened. By August 29 the storage pool was drained except for channels and small potholes. Only Black Brook was discharging water; the flow lines of both White Brook and the connecting

spillways were higher than the pool elevation. The flow at Black Brook was quite slow because the pool level had been lowered nearly to that of the Clyde River into which it discharges. Since the pool level had dropped below the gauge we could only estimate its elevation; that was about four feet below maximum or 581.00.

How many carp went out with the water into the Clyde River we can only conjecture. Considering the heavy concentration of fish at White Brook spillway just after the water dropped below the flow line there, plus the large number of dead fish along the channel between that spillway and the Clyde River, we feel safe in assuming that at least one third of the fish left the pool with the water.

As soon as the pool area had been reduced to channels and potholes the fish began to die in large numbers; the heavy concentrations rapidly used up all available oxygen. Thus even before the rotenone was applied it was necessary to start cleaning up the dead fish. Wherever it was possible to operate a bulldozer we buried them with that; in other places we loaded them into a dump truck and hauled them to where they could be buried with a bulldozer or buried them on the spot by hand. About half of the fish remaining in the pool were dead before the rotenone was applied.

During the conference in Boston information on the use of rotenone, sources of supply, etc. was obtained from Mr. Wallace of Blackwater Refuge and Mr. Otis of the Regional Office. At a meeting with State Conservation Department officials on August 29 it was agreed to conduct the spraying of their Oak Orchard Refuge pool and our pool as one operation. They would arrange for a plane from their Division of Lands and Forests to apply the rotenone, while we would supply the materials and handle local details regarding the operation.

Mr. Robert Perry of the Conservation Department estimated their Oak Orchard pool at 45 acres averaging 1½ feet in depth,-- 67½ acre feet to be treated. Although our storage pool encompasses approximately 1000 acres averaging about 2 feet in depth (except in the channels where it is considerably deeper), the area remaining after maximum draw-down was estimated at 30 acres averaging 3 feet in depth or 90 acre feet. Thus,in round numbers, a total of 160 acre feet remained to be treated. At the recommended rate of 1 gallon per 6 acre feet, about 27 gallons of Liquid Noxfish (Emulsifiable Rotenone 5%) was required. Since the area to be sprayed in our pool was largely narrow twisting channels some waste was inevitable. It was decided that 40 gallons of the material would be needed; an order was placed with S. B. Penick & Co., New York for that amount.

Some delay was experienced in obtaining delivery of the rotenone. The original order was placed by phone on September 2 but the shipment went astray enroute; it was not received until September 11. Immediately upon receipt it was mixed with water in 55 gallon drums at the rate of 12 gallons of Noxfish in each drum full of mixture,-- a 1 ; 3½ ratio. Meanwhile the spray plane had arrived at the Auburn airport about six air miles from the scene of our operation. One 55-gallon drum of the mixture was taken to the airport and loaded on the plane. Since there was too much wind for the "pin point" spraying of our storage pool channels, the pilot took this first load to the Oak Orchard pool which he treated just before dusk on the evening of September 11. At the recommended dosage the 12 gallons of Noxfish in that load was ample for the 67½ acre feet to be treated.

The plane returned to Auburn at 8:30 AM on September 12 and proceeded to spray the remaining two drums of mixture on our storage pool. With the first drum complete coverage of the borrow pits along the dike was obtained. With the second drum scattered channels and larger potholes including Tyre Marsh were treated; also about 60 percent of the borrow pits were again covered. On the first load the plane was timed at 22 minutes from take-off to landing. The pilot waited for us to drive from the airport to the refuge pool (about ten miles) before delivering the second load so approximately 1½ hours were consumed in the operation.

Results

Mr. Perry reports that within five minutes of the time of spraying at Oak Orchard carp began to show signs of being effected. Sixteen hours later the kill seemed to be 99 percent complete. Mr. Perry concludes: "I am sure that the final results constituted a 100 percent kill."

Our own pool presented somewhat different conditions than at Oak Orchard. It was impossible for the plane to follow closely all the bends of the borrow pit channels; also the standing timber over much of the route would not permit the near ground level flying necessary to place the spray exactly on those narrow channels. Even so we feel that a 100 percent kill was obtained in the more shallow potholes and channels. The deeper channels still contained live fish several days after the rotenone was applied. It is possible that in time the material would have been effective even in the deeper water; but with heavy fall rains an immediate possibility we could not afford to wait. The remaining

four gallons of rotenone was diluted with three parts of water and applied by use of back pumps; this was applied to the few areas the plane did not reach and to places where live fish were observed. Also an additional 10 gallons of Liquid Noxfish were ordered.

On Spetember 15, three days after the spraying was done, a heavy rainfall (1.72 inches) raised the water in the channels more than a foot. This, of course, diluted the rotenone concentration, possibly giving new life to those fish which were not dead. Since only in certain sections of the borrow pits did it appear that fish were able to live (fish did not spread from one section to another), we concluded that the dosage on those spots had been too light for the depth of water present.

On September 17 we again opened Black Brook spillway to draw the water back down to the lowest possible level. This was accomplished in thirty-six hours and on the evening of September 18 the gate was closed for the last time. By that time we had obtained delivery of the additional 10 gallons of Noxfish (48 hour service on this second lot). Part of this was applied that evening with back pumps (diluted with three parts of water); the remainder was sprayed on sections showing the least sign of life on September 19 and 20.

Two days after this application no live fish could be found in the pool. Also it was noted that Great Blue Herons which had been present by the hundreds during the draw-down, had deserted the area completely. Apparently they were living up to their reputation of eating only live fish; they ignored the solid mass of dead fish lining the shores. We have examined the pool on several occassions since the spraying was completed and have found no live fish. Further examinations

will be made; but for the present a 100 per cent kill is apparent.

As might be surmised the greatest problem is disposing of the dead fish. It is estimated that, counting those which died from lack of oxygen before the rotenone was applied, at least 100 tons of fish were disposed of. About 98 per cent of these by volume were carp and over 99 per cent of the balance were bullheads. A very few common sumfish, calico bass, golden shiners, gizzard shad and mud minnows also were observed.

As soon as dead fish began to appear our gull population increased from dozens to thousands. These birds with the help of a few hundred crows did a fine job of disposing of the dead fish. They were especially helpful on the relatively inaccessible areas. Back in the fallen timber area of the pool were numerous very shallow potholes. Blue Herons soon cleaned out the small fish there and the larger fish could not long survive under the hot sun. Then the gulls and their allies took over on the disposal. It would have been physically impossible for us to get to all of those areas before the fish had completely decomposed even with a much larger crew than that which was available. As it was we buried many tons of fish both by hand and using a bulldozer as described above.

Following is a tabulation of the costs of this operation to the Service. This does not include the time of permanent personnel involved:

40 gallons Liquid Noxfish @ $5.10 - -	204.00
Freight charges - -	5.84
10 gallons Liquid Noxfish @ $5.20 - -	52.00
Freight charges - -	2.63
2 laborers 68 hours @ $1.02 - - - -	69.36
1 Operator General @48 hrs @ $1.20 -	57.60
FICA on above - - -	1.89
Total	$393.32

At the time of this writing the storage pool had refilled to within 1.80 feet of capacity. This means that about 80 per cent of the original pool area is covered although most of it is very shallow. Further observations will be made to determine whether or not treatment was 100 per cent effective; also to determine the rate at which the pool is refilled. Information obtained will be submitted as an appendix to this report.

Respectfully submitted,

Eldon R. Clark

Eldon R. Clark, Refuge Manager

Montezuma Refuge
November 1, 1952

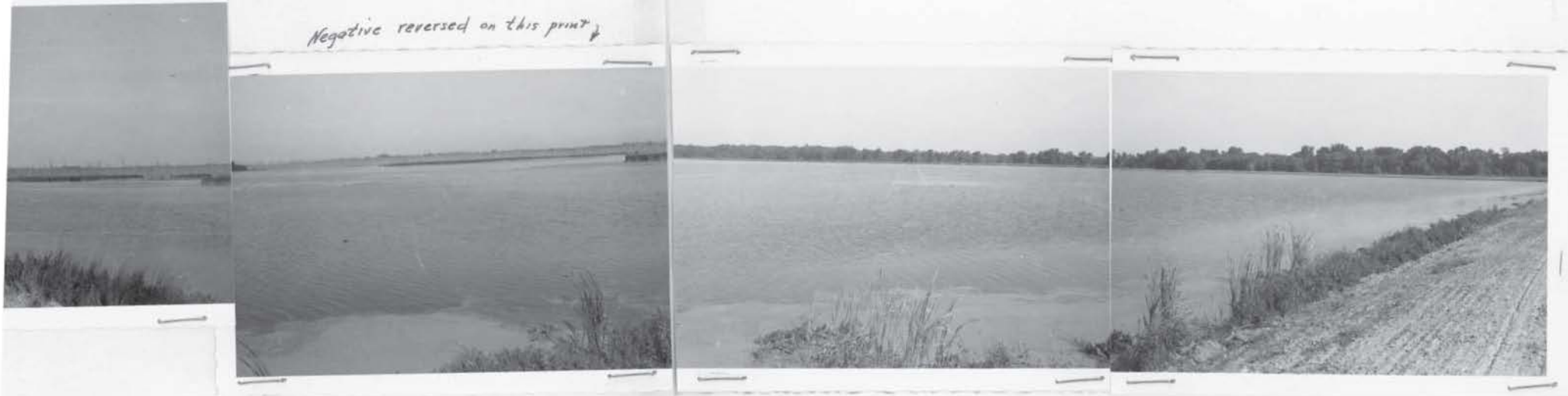
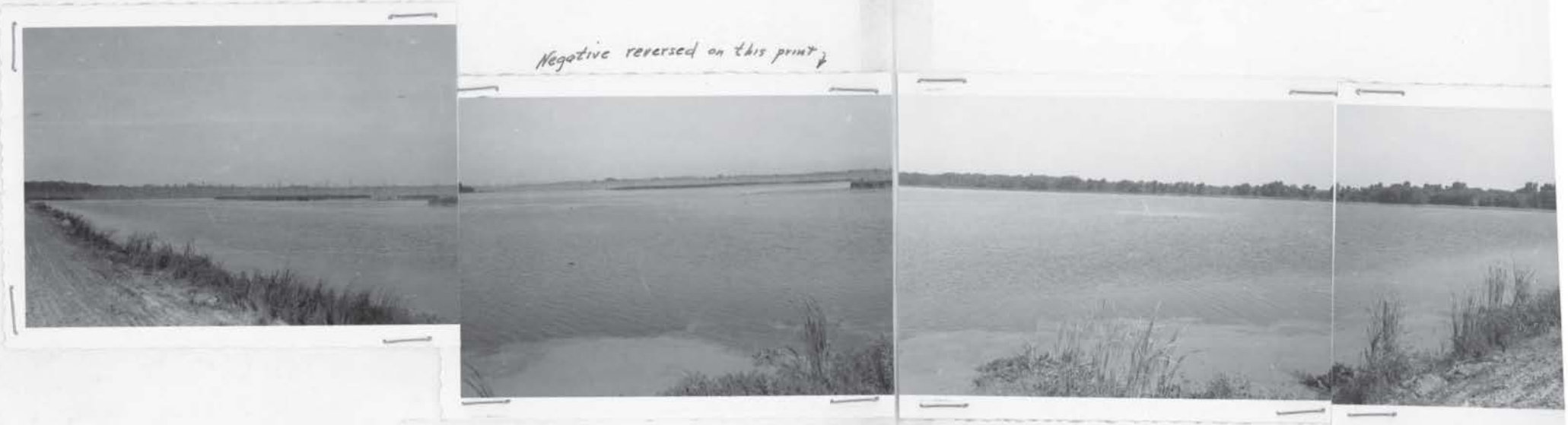


Fig. 1 - Storage Pool Before Draining



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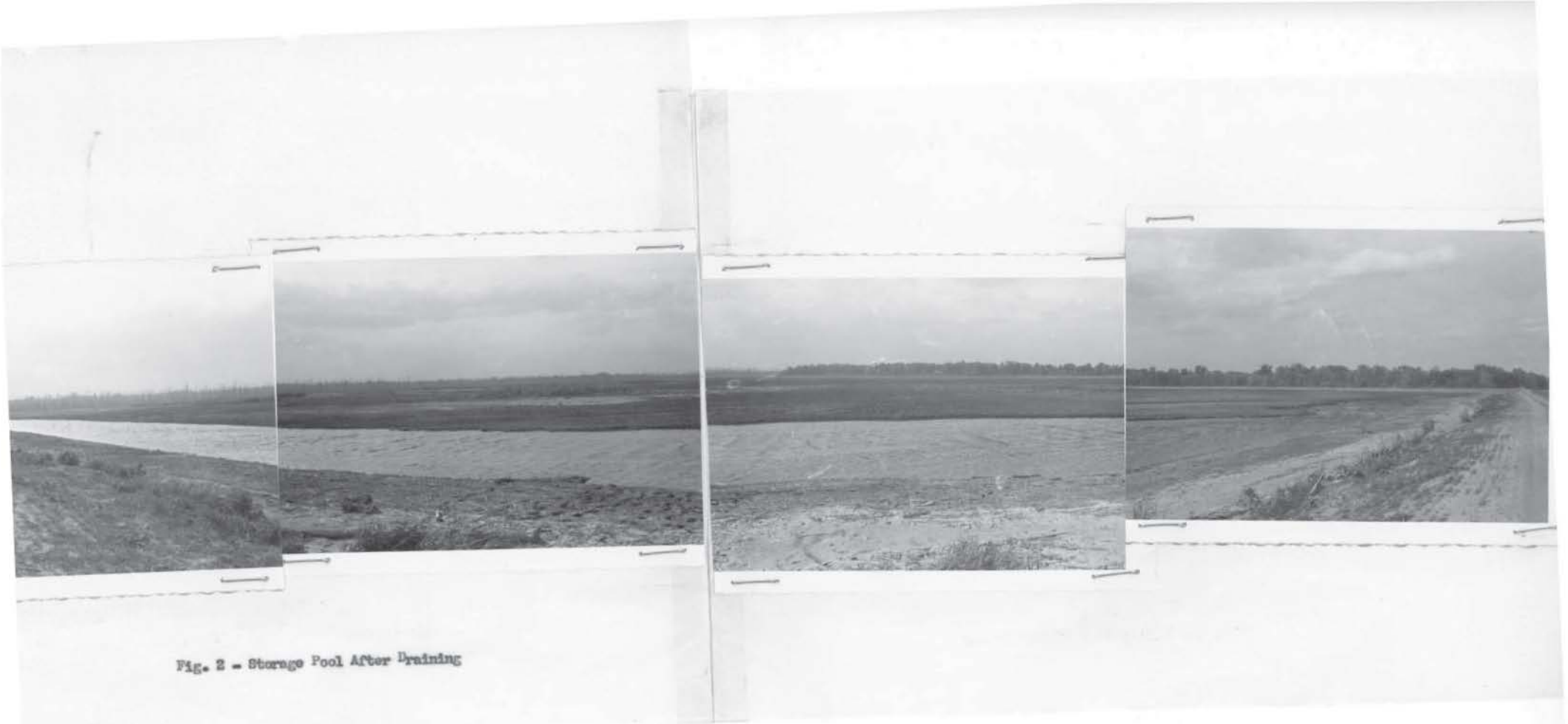

Fig. 2 - Storage Pool After Draining

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Figs. 3 and 4 - State Pilot Robert Mason Spraying Rotenone on Storage Pool

Figs. 5 and 6 - Dead Carp Line Shores After Rotenone is Applied. In bottom photo Fish Show as Bumps in a Green Carpet of Duck Weed.