

REPORT ON THE DESIGN AND CONSTRUCTION OF  
A PILOT SCALE BAIT FISH CULTURE FACILITY  
FOR WESTERN SAMOA

by

Gene Feldman  
Peace Corps Volunteer  
Fisheries Division  
Western Samoa

The pilot project was designed to test the suitability of Natural earthen ponds for bait fish culture. The site selected is located in a mangrove swamp, relatively close to a small river, with fairly compact soil and a heavy growth of marsh grasses. The two experimental ponds (7 meters x 11 meters) were dug by hand to a depth of three feet with walls of three feet in height being built up around them. The ponds took approximately one week each to complete with five men digging. A channel was dug from the ponds to the river allowed us to drain the ponds at low tide to facilitate digging, as the ponds would fill up with seepage water from the surrounding marsh. After the ponds had been dug to the desired depth, the outlets were filled, and 4" PVC pipes were placed at different levels through the wall. This allows the ponds to be filled and drained to any desired depth by the opening or closing of the pipes it also allows for water circulation without the need of a pumping system. The pipes are screened so as to prevent the escape of any fish from inside of the pond and the entry of any undesired fish from outside.

When the ponds were first constructed, the loose soil on the pond walls would wash into the ponds during a heavy rain, but the walls have now stabilized and grass has begun to grow along the walls which will help to further stabilize them. They are now quite solid and can easily be walked upon.

RESULTS OF GROWTH RATE EXPERIMENTS:

An experiment was designed to measure the rate of growth of fish in the ponds to determine accurately the length of time required to produce fish of baitfish size. A small netted enclosure was constructed and placed in the ponds with the bottom of the net resting on the bottom and with pieces of marsh grass floating on the surface to try and simulate as accurately as possible the actual conditions in the pond.



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A sample of approximately ~~five~~ newly released fry were placed in the enclosure and their growth measured. The measurements used are total length (from the tip of the snout to the tip of the caudal fin) in addition to the natural foods available in the ponds, the fish were given a supplementary diet of chicken mash, generally once a day.

There were times during the course of the experiment that the fish went with the supplementary feedings, and as a result I would expect that the growth rates were not as fast as they would have been if the experiment were conducted under optimal conditions. A random sample of the fish were measured every month and at the time of writing this report, the experiment has been going on for three months.

The growth rate experiments were being conducted at the same time that the various other factors involved in the pond operation were being worked out and as a result conditions in the ponds were often times very poor. With wide fluctuations in water level and temperature, times when supplementary feeding could not be done, and long periods of heavy rains causing great variations in the salinity of the water in the ponds. Taking these factors into consideration, I would say that the results of these experiments reflect growth under conditions that were well below optimum, some of which such as regular feeding schedules, and fairly constant water levels can now be maintained. With this in mind it seems that it would be possible to produce bait sized mollies (40-55-mm total length) within three months.



Based on an optimum stocking density of five fish per gallon which was found to yield maximum growth in experiments conducted in American Samoa, it should be possible to stock the two existing ponds with at least one hundred pounds of baitfish sized fish. We are now in the process of expanding our facilities which will involve the construction of four additional ponds each with a capacity of approximately two hundred pounds of bait each. When these ponds are completed and have been fully stocked, we will have on hand hopefully one thousand pounds of bait with which we should be able to carry out our fishing trials.

At the recent time, no aeration is supplied to the pond but with the completion of the new ponds, we will install an aeration system to get raise wheather or not it is for this to to increase the holding capacity of the ponds. For the initial experiments, that including the fishing trials, the present site will be adequate but if it is decided to expand the facilities any further it would be if a naturally occuring body of water could be used and partitioned off as then warranted. One site that has been looked at is one the south coast of Upolu rear the village of Safata. Further investigation need to be carried out before an ideal site could be selected.



REPORT ON INITIAL FISHING TRIALS

Friday 14 May -

Seined seven pounds of mollies from the pond and transported them from the ponds to fisheries in the baitskiff. Fish were transferred to MUMUA and headed North northeast. Sighted several schools. Worked one school which was seen to be feeding actively on the bait but would not approach within twenty yards of the boat. The amount of bait was insufficient to continue through bait, as it was extremely difficult to remove bait from the bait box once they was not a great deal of fish left.

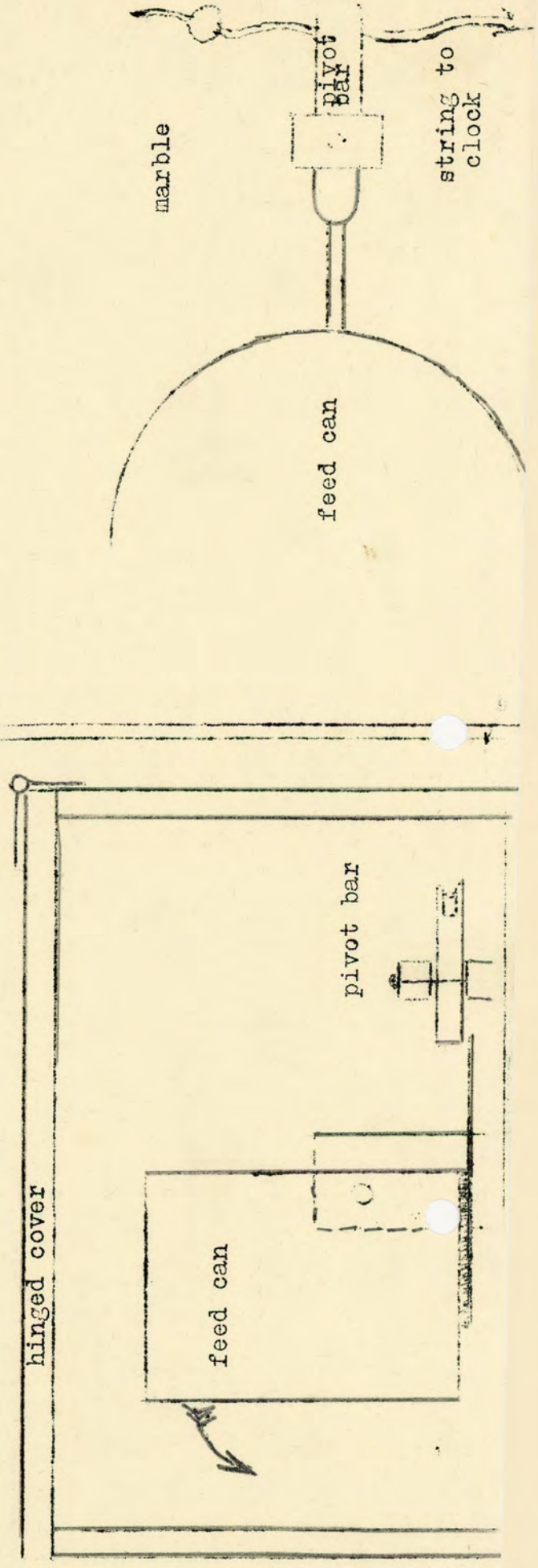
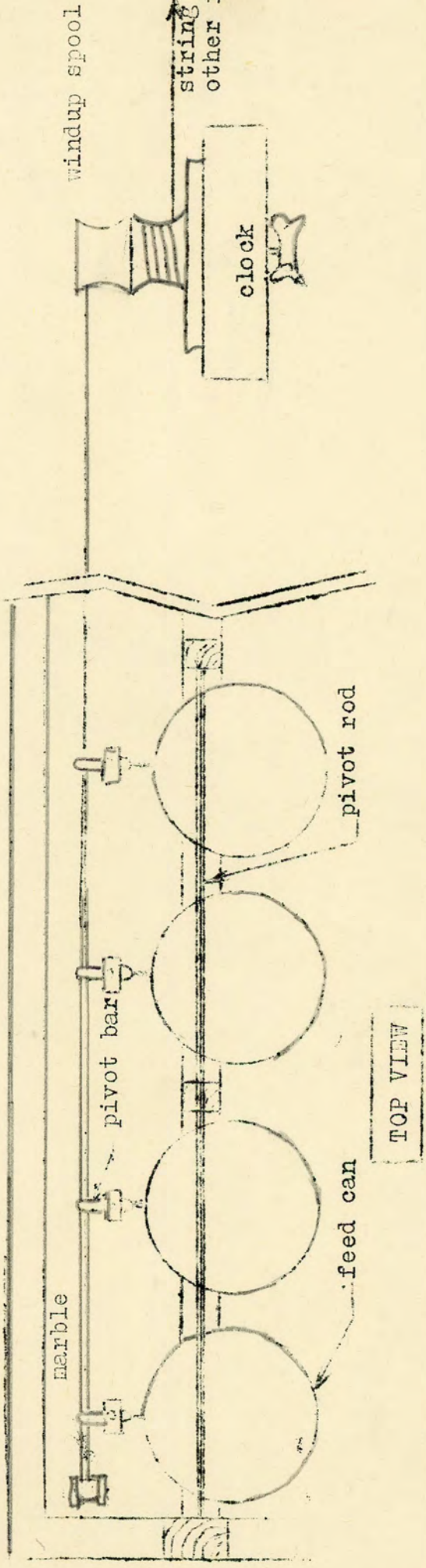
Monday 18 May -

Seined approximately 20 pounds of bait from the ponds which were transferred to MUMUA. Left fisheries heading North in the early afternoon and did not sight the first school until five o'clock. Did not pick up any fish on the trolling lines and it was decided not to try working the school. Returned to fisheries about 6.30 p.m. and transferred half of the bait into the baitskiff and left the remaining fish to the box on board Mumua.

Tuesday 19 May -

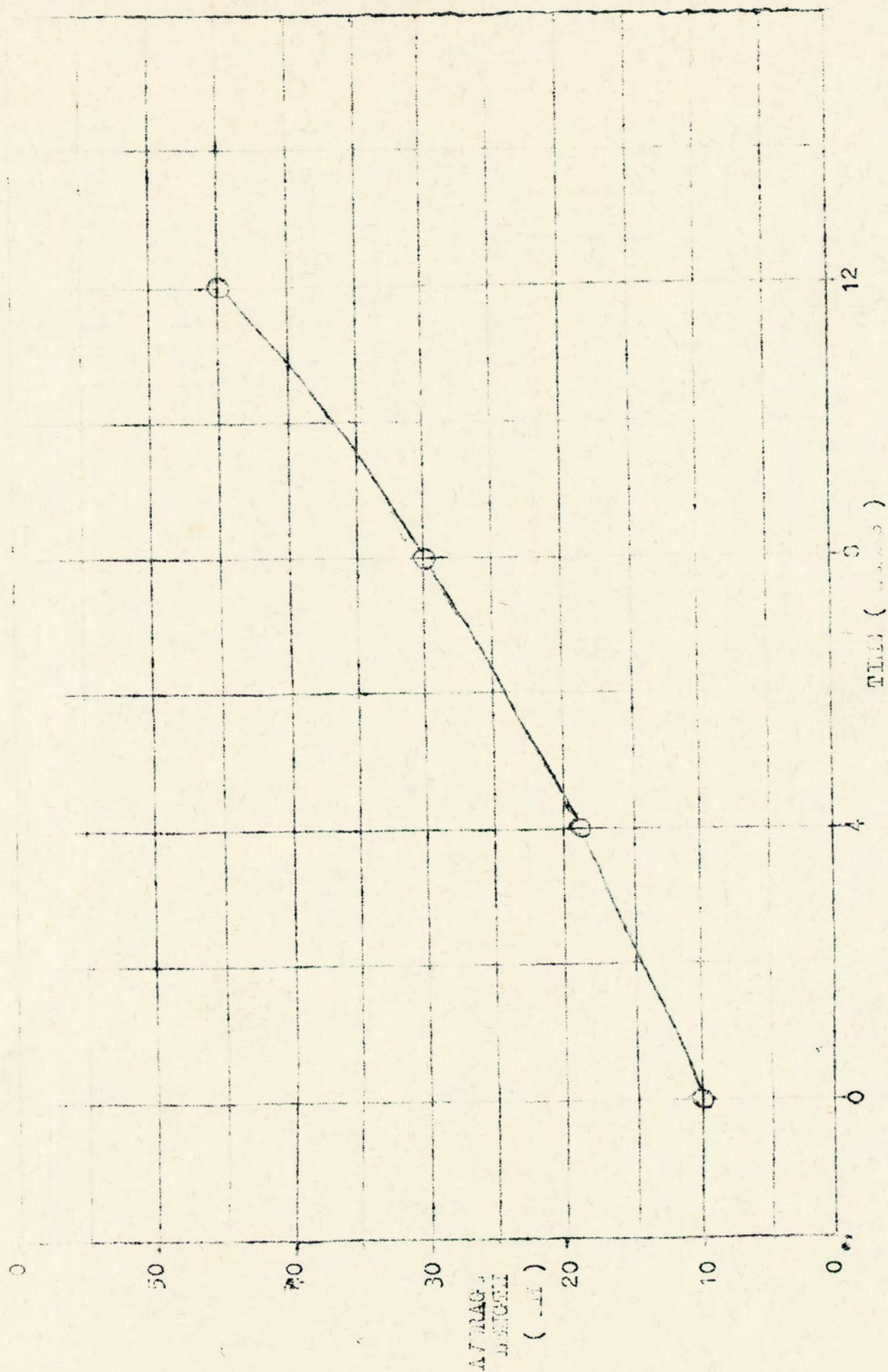
Transferred fish from the baitskiff back onboard Mumua with no mortality either in the bait box or in the skiff during the night. Left fisheries about 7.15 a.m. and headed NNW. Sighted a school of skipjack and began throwing the bait. The school reacted and came to the boat and could be seen feeding on the mollies all around the boat. Held the school around the boat for 10-15 minutes but failed to take any fish on the poles. At this time the boat lacked a spray system tried turning off the engine, but it had no effect on the behaviour of the tuna. Used approximately 12 pounds of bait. Began trolling chumming the lines with the remaining bait. Pick up sixteen skipjack.





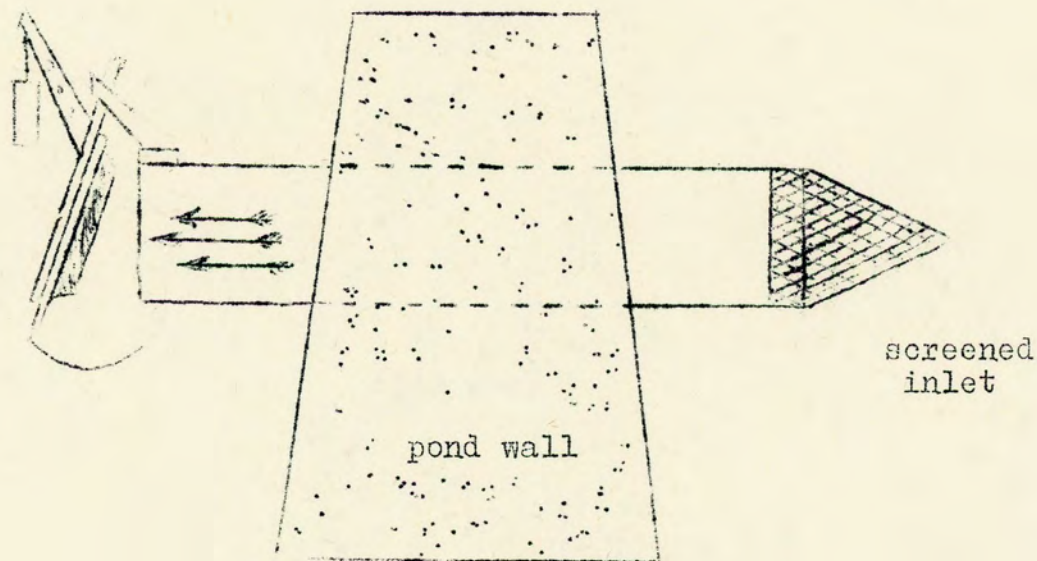
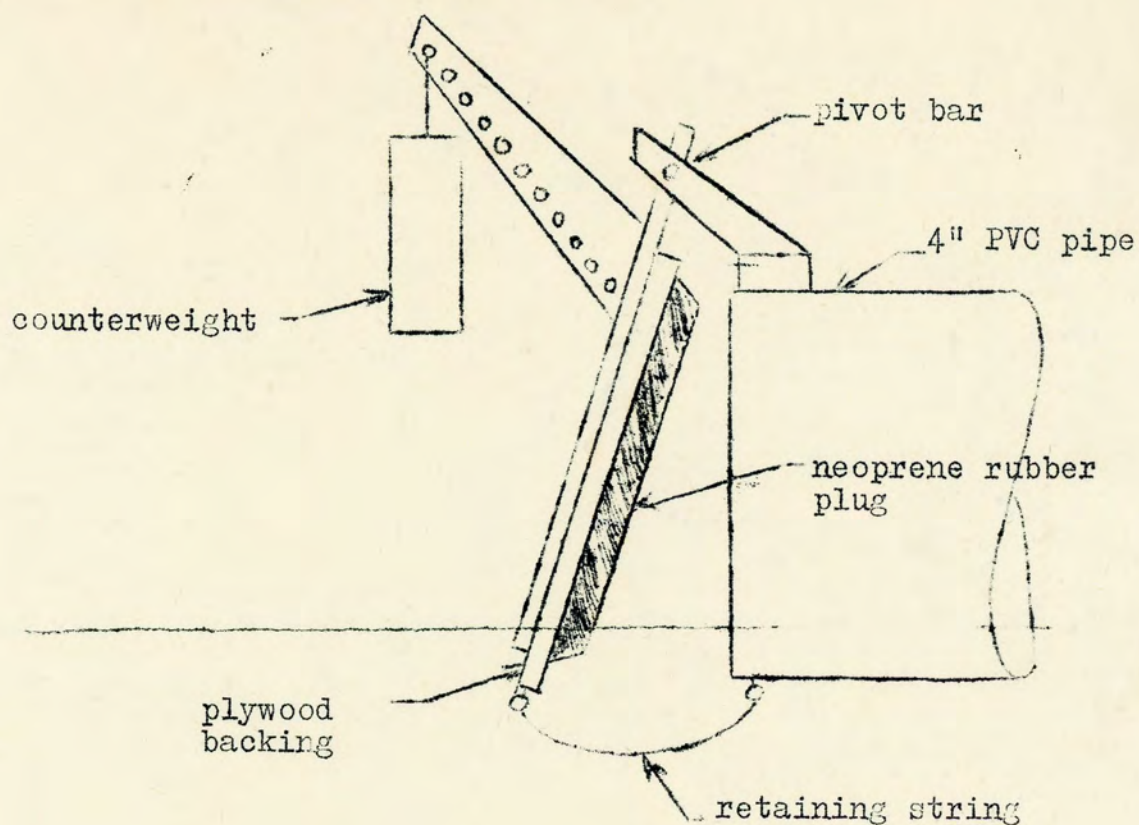


RESULTS OF THE GROWTH RATE EXPERIMENTS





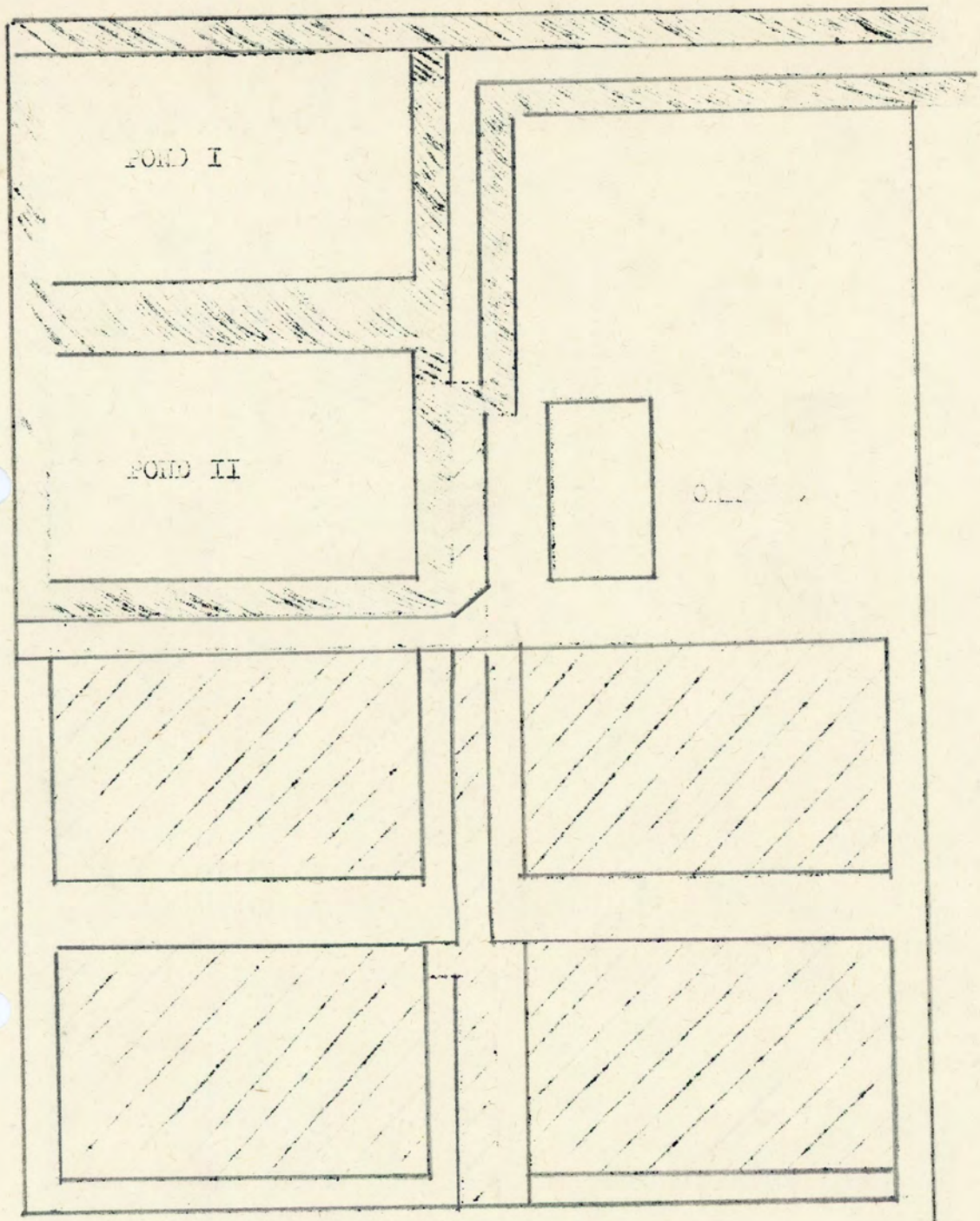
## TIDAL OPERATED VALVES



As the water level rises outside of the pond, due to the incoming tide, the pressure of the water will open the valve once the water is higher on the outside of the pond than on the inside. The valve will remain open until the water level is equal on both sides of the pond wall at which time the counterweight will close the valve. As the tide goes out, the higher water level within the pond will tend to keep the valve tightly closed until the next high tide at which time the cycle will repeat itself, replenishing any water that may have been lost through seepage out of the pond or by evaporation. The screened inlet prevents any fish from escaping, as well as preventing the entry into the pond of any unwanted species.



RIVER



Plan of existing pilot project with possibilities for future ponds shown by dotted lines

Scale: 1 inch = 14 feet