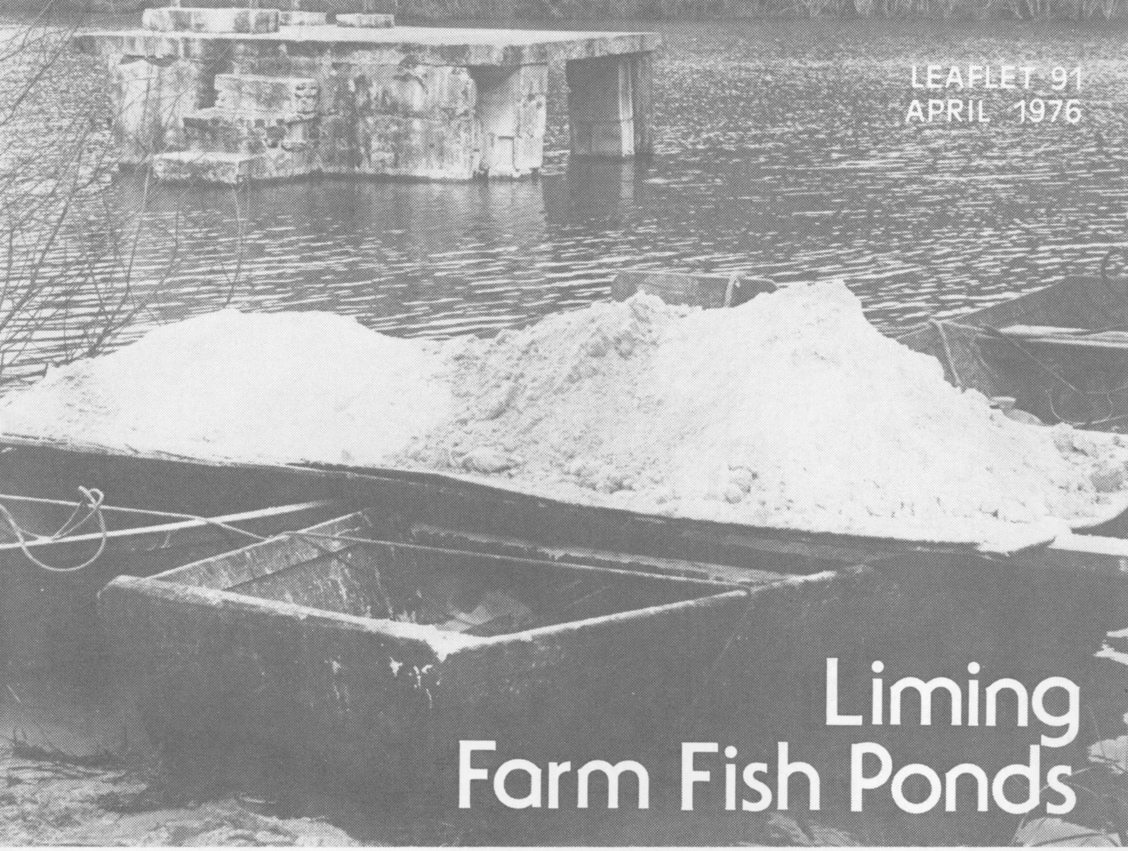
LEAFLET 91
APRIL 1976



Liming Farm Fish Ponds

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Lime is often applied to improve conditions for fish growth in ponds with soft waters and acid bottom muds *(1,2,3, 4,6,7)*. Liming increases the hardness, alkalinity, and pH of pond waters and increases the pH of bottom muds *(1,2,3)*. Humic substances which impart brown stains to pond waters may be removed by lime treatment *(6)*. These changes in water quality following lime application improve response of plankton to fertilization and result in better fish production *(1,7)*. Research at the Fisheries Research Unit, Auburn University Agricultural Experiment Station, has resulted in better procedures for liming fish ponds *(1,3,5)*.

WATER HARDNESS AND LIMING

Experiments demonstrated that liming soft water ponds to increase water hardness to at least 20 ppm increased fish production *(1,7)*. Therefore, a survey of water hardness in Alabama ponds was conducted and a water hardness map prepared (Figure 1). Water hardness of ponds in the Black Belt usually exceeds 20 ppm. However, some ponds in the Black Belt on acid or sandy soils have waters softer than 20 ppm. The hardness of pond waters in other areas of Alabama may or may not exceed 20 ppm

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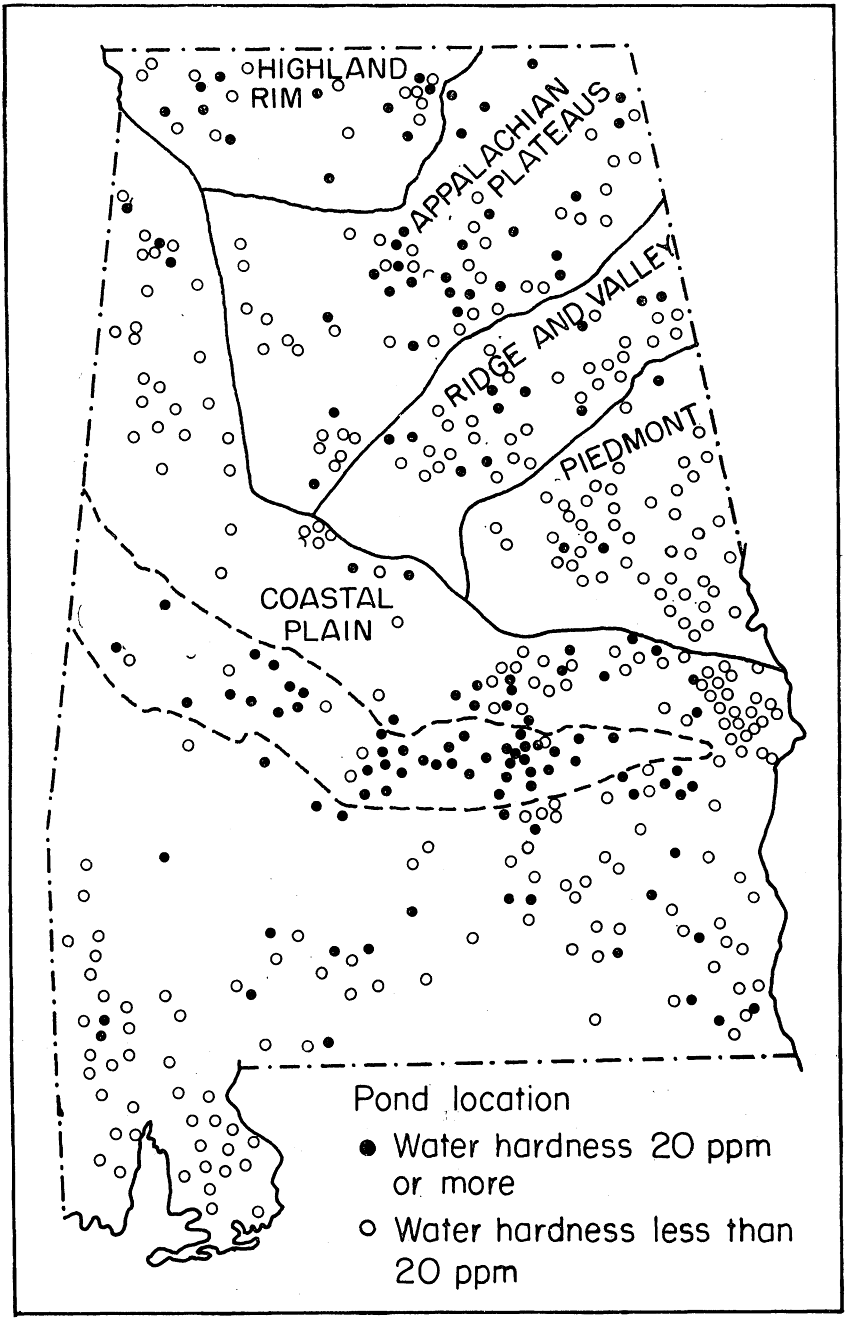

FIG. 1. Location of ponds with water hardness of 20 ppm or more (solid dots) and below 20 ppm (open dots). The Black Belt area of the Coastal Plain is indicated by broken lines.

(Figure 1). Therefore, water analysis is the only accurate way of determining if pond waters are too soft for good fish production. Conditions which suggest that a pond may need lime include; stained water, poor response to inorganic fertilization, and poor fish growth.

SAMPLES FOR LIME REQUIREMENT

Boyd *(2)* modified the lime requirement procedure for agricultural soils for use on fish pond muds. Procedures for collecting mud samples were also developed. Lime requirements of muds from shallow water were lower than those of muds from deeper water. Therefore, samples were taken from different areas of the pond bottom and equal volumes of each sample composited and dried to give a sample for lime requirement determination. Adequate samples for 1 to 5-acre ponds on the Fisheries Research Unit required muds from 10 to 12 different sites. The number of samples composited was increased proportionally for larger ponds. A simple mud sampler was devised by attaching a can to the end of a pole (Figure 2).

APPLYING LIME

Although agricultural limestone can be easily applied to new ponds before they are filled with water, application proved more difficult when ponds were full of water. Good results were achieved by broadcasting agricultural limestone evenly over the entire pond surface. Bags of limestone were emptied from a moving boat. Bulk agricultural limestone was cheaper and was applied from a plywood platform attached between two boats (Figure 3).

Limestone was applied during late fall or early winter so that it reacted with water and bottom muds before fertilizers were applied in the spring *(1)*. Agricultural limestone will precipitate phosphorus if applied at the same time as fertilizer. Liming was not effective unless fertilizer was properly applied during warm months.

RESIDUAL EFFECT

The residual effect of liming as indicated by water hardness was governed by the rate of water loss to seepage and overflow. For example, liming was ineffective in Grier's Pond with a water retention time of 3 weeks (Figure 5). Liming was also less effective in Pond S-6 which has year around outflow than in Ponds S-11, S-12, S-13, and S-19 which have outflow only during rainy weather (Figure 4).

WATER HARDNESS BEFORE AND AFTER APPLICATION OF AGRICULTURAL LIMESTONE TO FIVE PONDS

Initial water hardness	Lime requirement	Water hardness 6 months after limestone application
p.p.m.	*Lb./a.*	*p.p.m.*
11.8	600	27.8
11.4	3,000	21.4
13.2	4,500	32.0
11.2	5,500	32.4
8.8	8,000	39.8

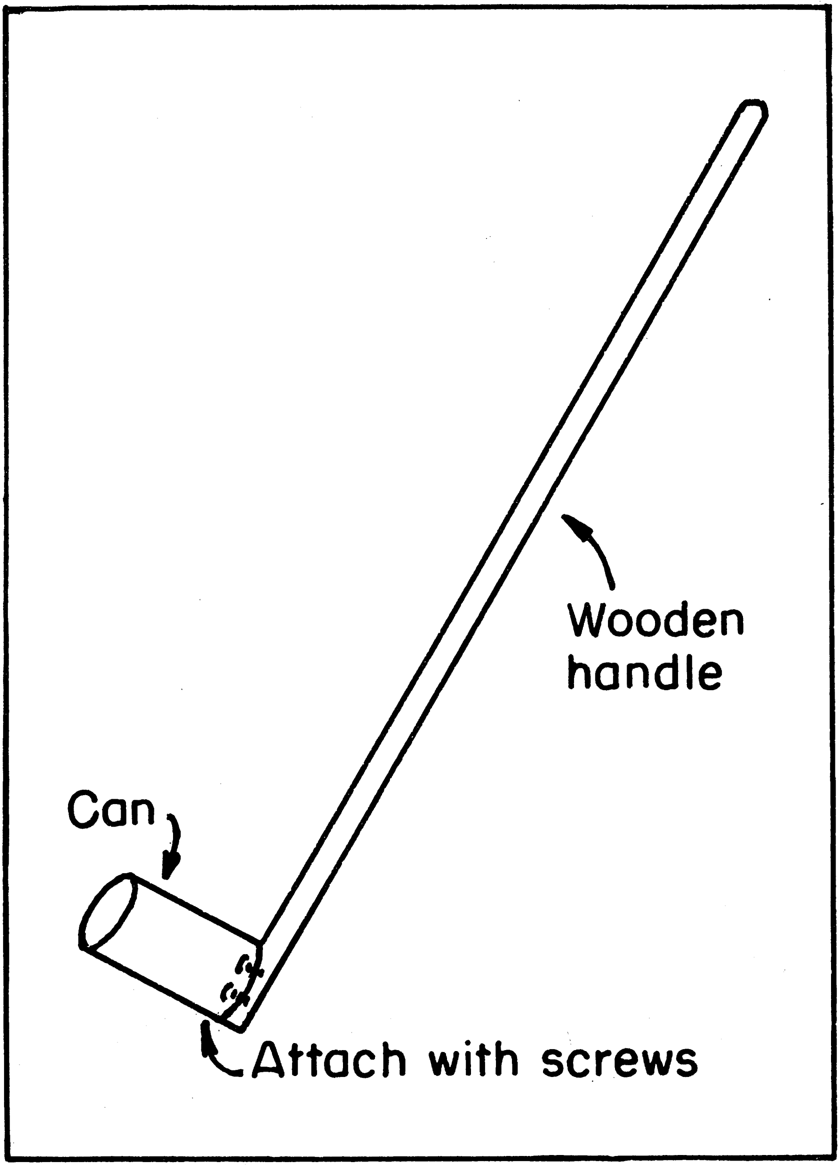

FIG. 2. A simple sampler for collecting mud from pond bottoms.

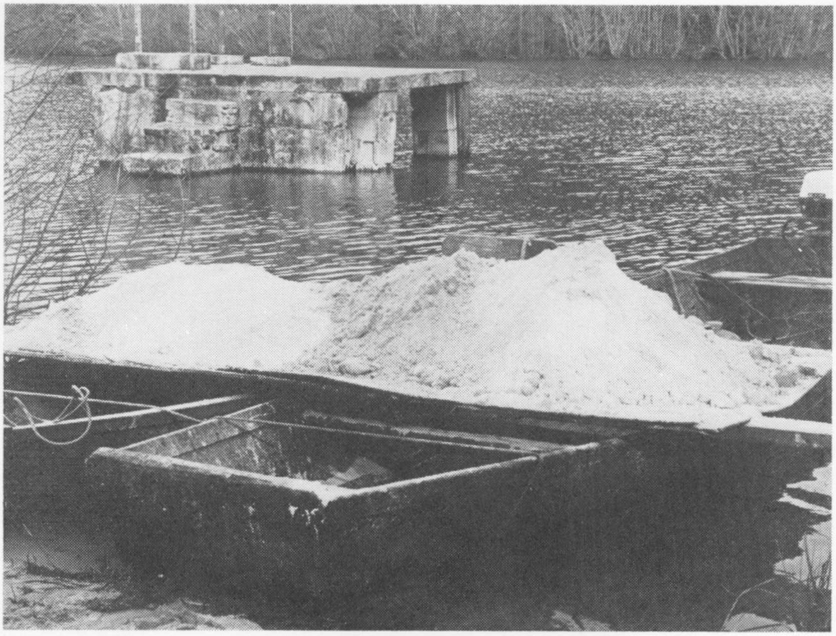

FIG. 3. A floating platform for broadcasting agricultural limestone.

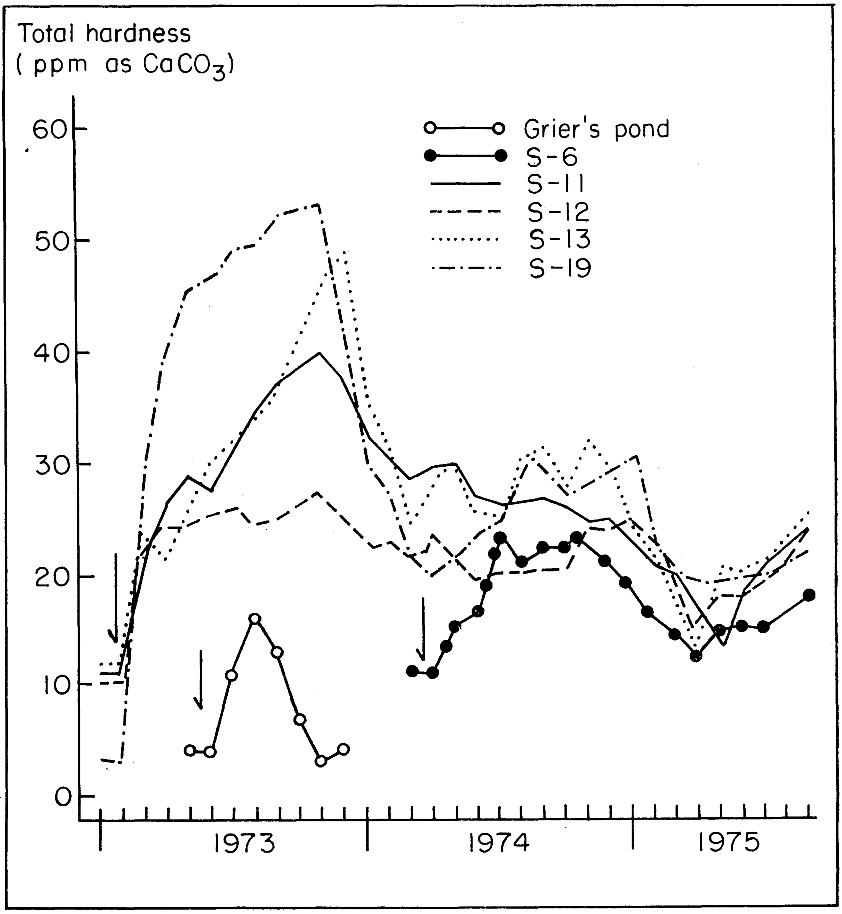

FIG. 4. Residual effect of liming on water hardness in six ponds. Grier's pond has a water retention time of 3 weeks. Pond S-6 has year around outflow while the other four ponds have outflow only during rainy weather.

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2nd Printing 3M, September 1976