STUDY RESULTS

STREAM QUALITY

Water analyses of samples collected on a monthly basis from June 1970 to June 1971 indicate that the main stem of Muddy Run is acid from its headwaters to its mouth. The pH in the upper two-thirds of the main stem averages below 4.0 and a net acid concentration of more than 100 mg/L. The lower one-third, from Beccaria to the mouth, improves slightly to an average pH of 4.4 and a net acid concentration of 54 mg/L. The total pollution load, however, increases considerably in the last onethird of the main stem due to the contribution from Little Muddy Run. Actually, Little Muddy Run is alkaline throughout most of its length. However, it is rendered acid about one-third mile from its confluence with the main stem by the largest pollution source of the watershed, the Brookwood Shaft Mine discharge. This is discussed further under Description of Pollution Sources.

Public use of streams of the watershed is essentially limited to Little Muddy Run. This.stream, which originates in State Game Lands No. 158, supports a game fishery and is also impounded near Janesville for boating and fishing recreation. There is no known domestic water

supply use of any of the watershed's streams.

Much of the headwater area of Muddy Run is lightly inhabited, and the stream is comprised of a series of riffles and pools which would make ideal conditions for a trout fishery if water quality was improved. At present Boy Scout and nature trails are actively used by naturalists and hunters. The watershed has an excellent potential for providing an outdoor recreation setting to augment those of the nearby State Game Lands.

CLEARFIELD CREEK

Muddy Run water quality is particularly important to water uses of Clearfield Creek and the West. Branch Susquehanna River. Clearfield Creek above its confluence with Muddy Run is reported to support aquatic life in many of its reaches. Water quality data collected by SKELLY and LOY during high water flows of March and April 1971 for the Corps of Engineers [(1)] indicate pH readings of 4.1 to 7.1 at six main sampling station-9. The higher pH readings were prevalent during highest flows. This fluctuating water quality apparently allows aquatic life to survive and propagate, but aquatic populations are undoubtedly depressed.

Below the confluence of Muddy Run, Clearfield Creek's water quality rapidly degrades and a sport fishery is reportedly non-existent.

(1) Unpublished data of the Corps of Engineers, Baltimore District.

Subsequent flows from other acid streams of much smaller size than Muddy Run add to the final pollution load to the West Branch. These streams are Japling Run, Pine Run, Lost Run, Upper Morgan Run, Potts Run, Longs Run and Roaring Run. The study indicates that Muddy Run contributes an average of 15,000 pounds of acid per day, compared to an average acid load of 97,000 pounds per day discharged by Clearfield Creek to the West Branch, or about 40%. Upstream of the Muddy Run confluence, Clearfield Creek contained an average net acid load of 11 ,500 pounds per day. However, this station indicated a net alkalinity in seven of the twelve samples.

A comparison of acid loads in Muddy Run and Clearfield Creek was also conducted in another manner. A U . S . G . S . stream gaging station is situated at Dimeling, a point on Clearfield Creek about seven miles from its mouth. Watershed area above this point is 370 square miles. Forty-five years of flow duration records indicate that 290 cfs is the flow that is equalled or exceeded 50% of the time. Water quality data collected quarterly at that station by the Commonwealth since 1962 indicates that at about 290 cfs the net acid and iron concentrations in the stream are 17 mg/ L and 4.2 mg/L respectively. This represents acid and iron loads of 24, 600 and 6, 080 pounds per day, respectively.

Muddy Run, at its mouth, has a tributary area of 37 square miles or 10% of Clearfield Creek at Dimeling. Assuming a direct ratio of

flows, the 50% flow at the mouth of Muddy Run would be 29 cfs. At that flow, the study found the acid and iron, concentrations to be about 58 mg/L and 12.8 mg/L, respectively. These represented acid and iron loads of 8,160 and 1 ,800 pounds per day, respectively.

These data would indicate that Muddy Run's acid load represents 33% of Clearfield Creek's load at Dimeling during the 50% flow duration. The iron would represent about 30% at that time. Since Clearfield Creek's pollution load is only slightly increased between Dimeling and the mouth by two small acid streams, the above percentages would not be changed significantly. This provides good corroboration of the data collected in this study.

Stream sampling data indicates that a number of small streams on the Muddy Run watershed contain relatively high concentrations of alkalinity. It was found that these are generally located in the north-central portion of the watershed where the Lower Freeport coal seam has been extensively strip and deep mined. It. was determined that these streams received large discharges from old Lower Freeport coal workings. These discharges contain alkalinities with average ranges from 70 to 100 mg/L, iron from 0.2 mg/L to 5.5 mg/L and pH from 6.4 to 7.2. These alkaline contributions now aid in ameliorating the effects of the acid discharges, and will play a vital function in overcoming residual acid discharges after

pollution abatement measures are completed. This can be surmised from an examination of the data. The average daily pollution load from all measured sources is 34,700 pounds of acid per day. The alkaline sources measured 4,800 pounds per day. Since the average acid load at the mouth of Muddy Run is 15,700 pounds per day, then all unmeasured sources of water, both acid and alkaline, cause a net neutralizing effect of 14,200 pounds of alkalinity. These sources are probably ground water seeps to surface streams for the most part.

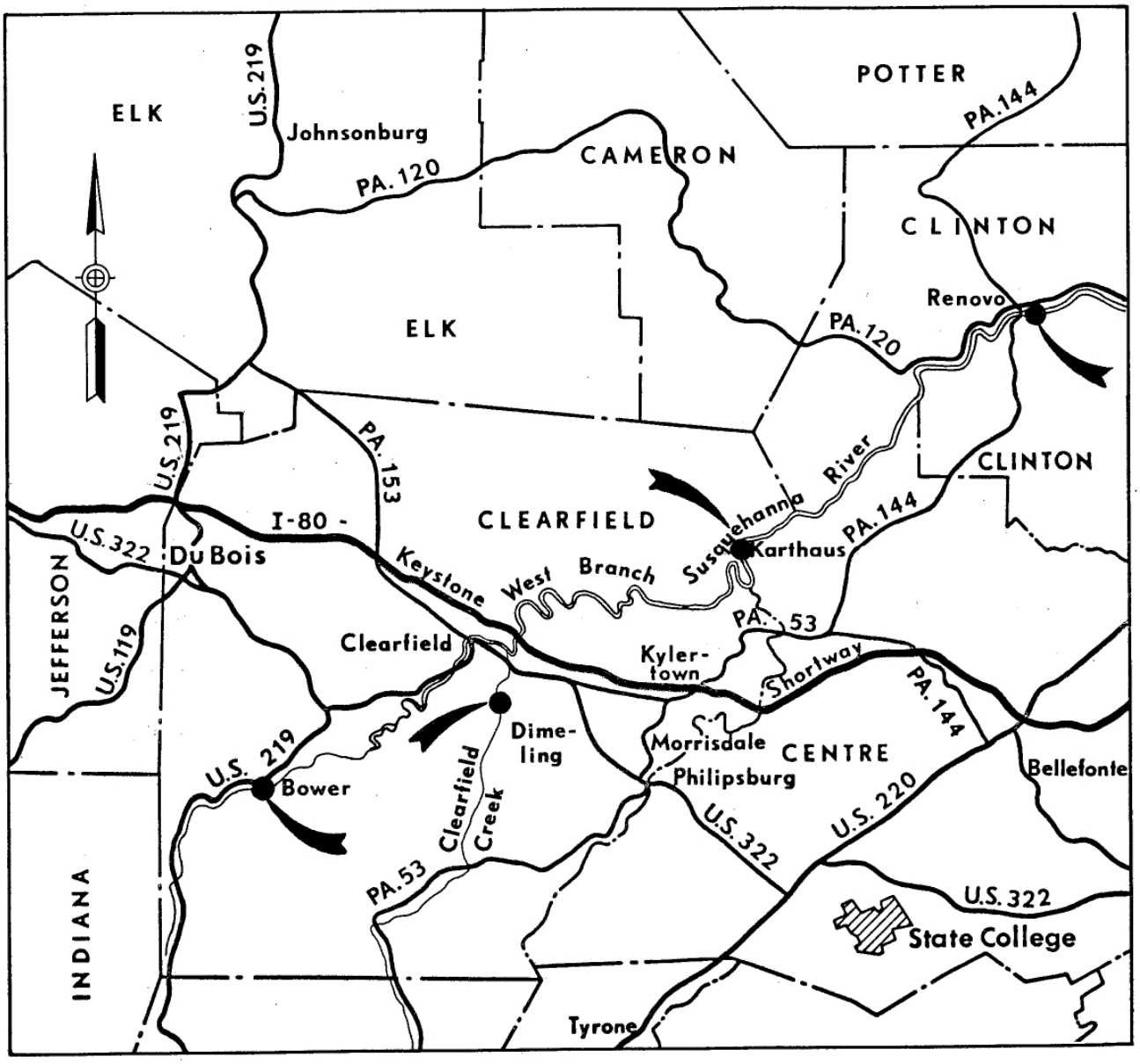
It is interesting then to speculate that if the acid at the sources can be reduced below 16,000 pounds per day, or 50%, we might expect that Muddy Run would become alkaline at its mouth. Further reductions would provide needed alkalinity for neutralization of Clearfield Creek. It might further be speculated that the water prevented from becoming acid by mine sealing, water diversion and strip mine restoration will remain alkaline, thereby further adding to the alkaline water resources of the watershed.

WEST BRANCH SUSQUEHANNA RIVER

As was reported and documented in a previous report(1) the West Branch Susquehanna River from the Curwensville Reservoir to the confluence with Clearfield Creek has significantly improved in water quality.

(1)Skelly and Loy "Alder Run Mine Drainage Pollution Abatement Project", July 1970.

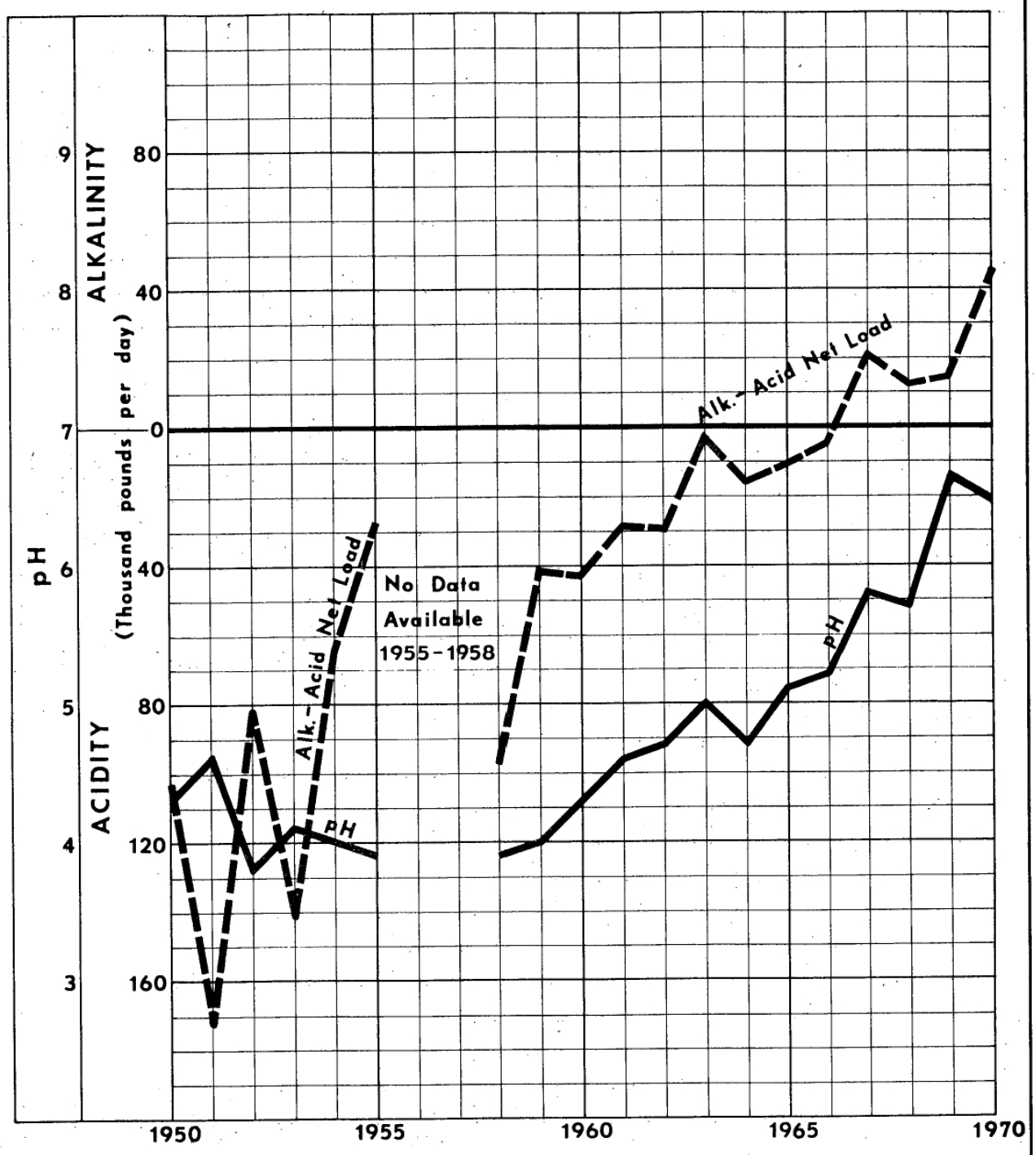
WATER QUALITY



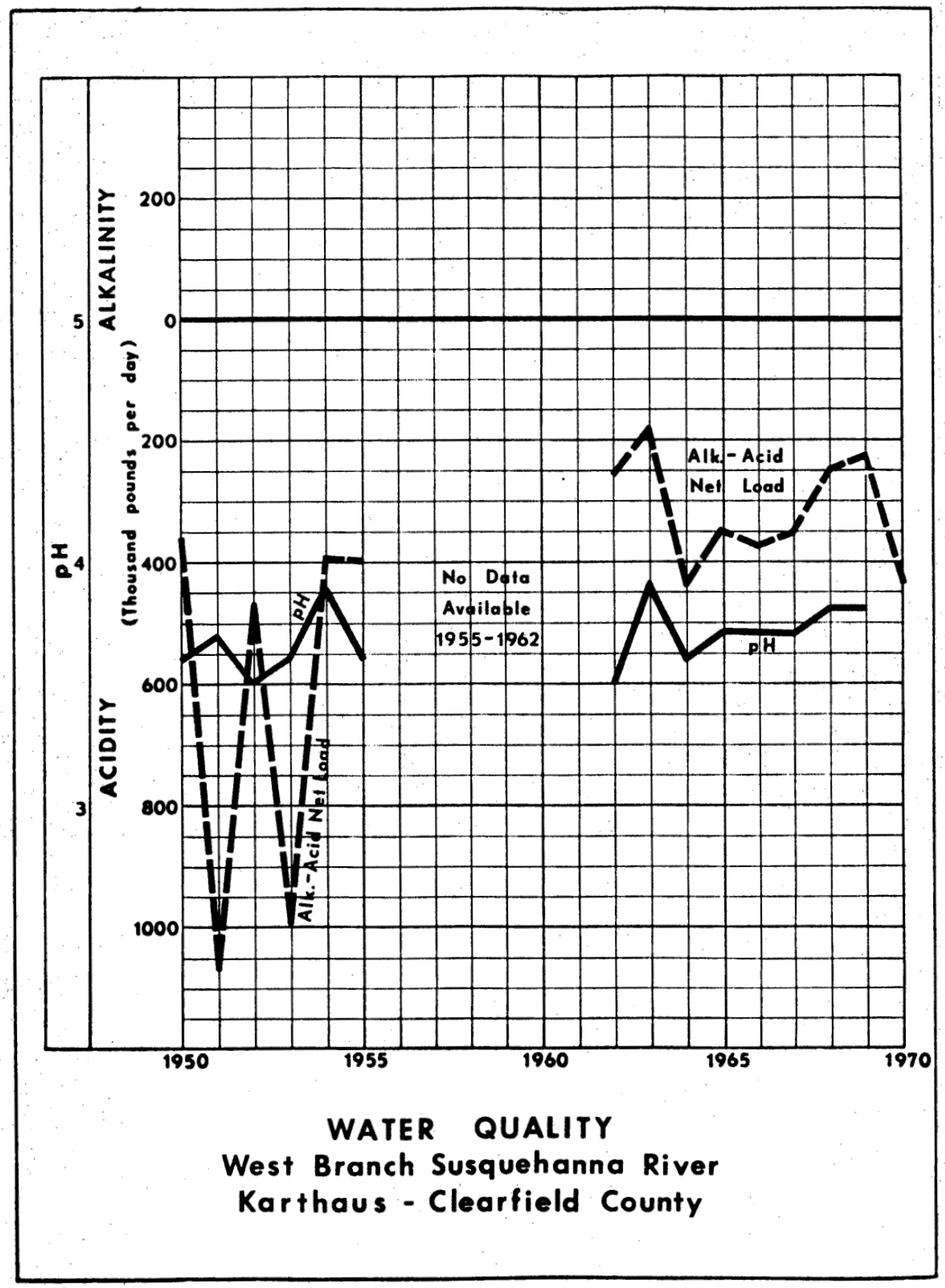
LOCATION MAP

9 6 3 0 9

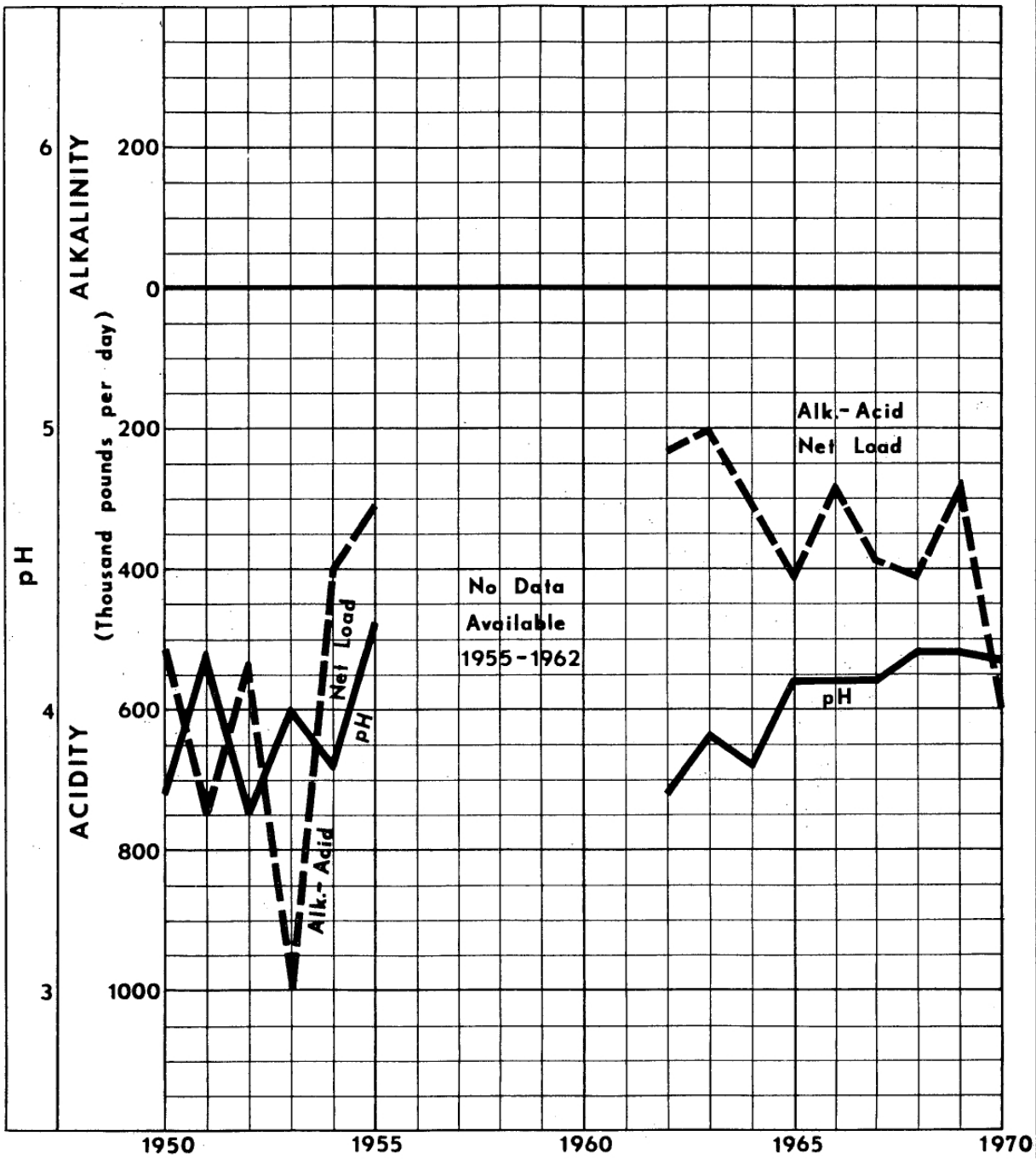
Scale in Miles



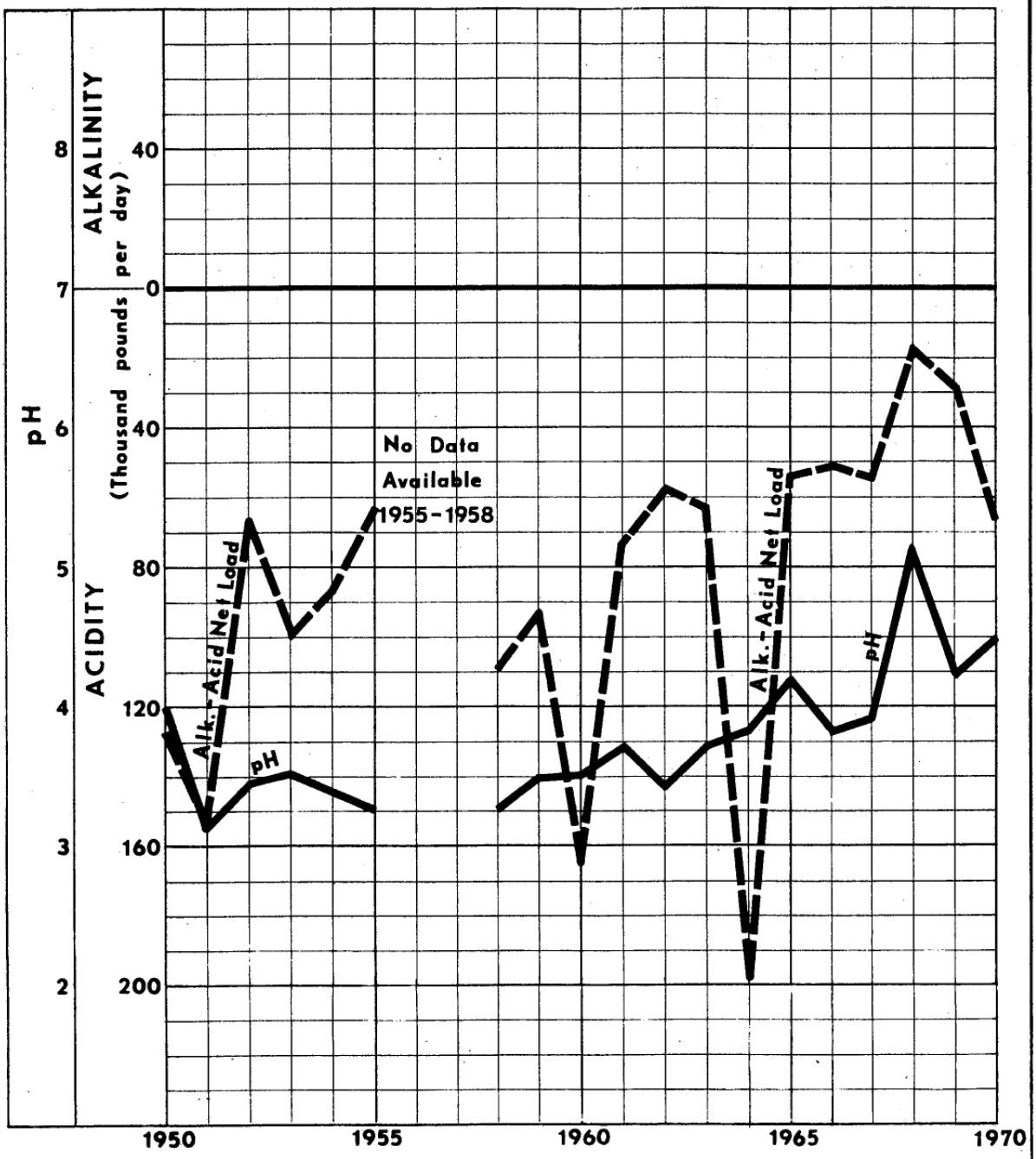
WATER QUALITY
West Branch Susquehanna River
Bower - Clearfield County



WATER QUALITY
West Branch Susquehanna River
Karthaus - Clearfield County



WATER QUALITY
West Branch Susquehanna River
Renovo - Clinton County



WATER QUALITY
Clearfield Creek
Dimeling - Clearfield County

during the past several years (see exhibits). This improved section of the main stem now provides about eight miles of new fishing waters in an area in need of such a recreational resource.

Clearfield Creek, draining from the south, then enters the West Branch bringing with its flow 37,000 pounds of net acidity on an average day. The river's water quality is degraded by this inflow to a point that only marginal fishing at a few locations is possible. Even this condition is an improvement over that of a few years ago prior to improvement of upstream river water. From the confluence of Clearfield Creek to Moshannon Creek, the combined acid load from thirteen (13) small tributaries almost match Clearfield Creek's acid contribution. Finally, thirty-six (36) miles down river from Clearfield Creek, Moshannon Creek water enters the river with 130,000 pounds acid per day which completely destroys all desirable aquatic life.

This thirty-six (36) mile stretch of river between the confluence of Clearfield and Moshannon Creeks is of particular interest to this study. Any reduction in acid load from Clearfield Creek would improve the quality of the marginal water in that portion of the river. Abatement measures now underway on Alder Run, one of the thirteen small tributaries mentioned, would further add to overall improvement.