

4.0 SUMMARY

The USACE implements a yearly monitoring program at F. E. Walter Reservoir to evaluate potential public health concerns. In general, the monitoring programs emphasize measuring water quality and sediment contamination. Monitoring results are compared to state and federal criteria to evaluate the condition of F. E. Walter Reservoir. The 2002 monitoring program of F. E. Walter Reservoir comprised seven major elements:

- Monthly water quality and bacteria monitoring from May through October to evaluate compliance with the Pennsylvania state water quality standards;
- Meteorological monitoring of air temperature, relative humidity, solar radiation, wind speed and direction every ½ hour at the F. E. Walter Reservoir discharge tower;
- Sediment priority pollutant monitoring of PCB's, pesticides, and volatile organic compounds to evaluate sediment toxicity relative to identified screening concentrations;
- Drinking water monitoring to ensure public health safety by comparing water quality from a drinking water source to standards determined by the Safe Drinking Water Act (SDWA);
- Hydrogen sulfide and dissolved metal samples were collected on 7 August and 5 September to further monitor the lake during anoxic conditions;
- Ambient water temperature was recorded every ½ hour with Onset Computer Corporation TidbiT™ probes at five stations along the Lehigh River; and
- Physical water quality monitoring at five stations along the Lehigh River.

4.1 WATER QUALITY MONITORING

Water quality monitoring at F. E. Walter Reservoir generally indicated the presence of acceptable conditions during 2002. In general surface and downstream water quality were in compliance with the PADEP water quality standards. However, dissolved oxygen (DO) in more than half the water column of the reservoir (WA-2, -6, and -7) was below standard (a minimum concentration of 5-mg/L) from June through October. Measures of pH were not in compliance with the PADEP water quality standard range, the range is from 6 to 9. Stations WA-3 and WA-5 were below the standard on October 23. Stations WA-2, -6, and -7 were below the standard throughout the monitoring period with the exception of May 22 and August 20. F. E. Walter Reservoir contained acceptable levels of nutrients during 2002. Measures for total phosphorus with results greater than the detection limit exceed the EPA guideline in 69% of the samples. Ammonia, nitrate +

nitrite, TDS, and alkalinity were in compliance with state water quality standards throughout the reservoir watershed.

4.2 MONITORING PROGRAM TRENDS

Trends computed for individual stations using the Mann-Kendall test indicated significant water quality changes at several locations in the F. E. Walter Reservoir drainage. DO was decreasing in the spring at WA-2 and the summer at station WA-5. Ammonia was decreasing in the reservoir watershed except at WA-5 in both spring and summer seasons. Station WA-1 had a decreasing trend for total nitrogen during the summer. Trends for fecal coliform were increasing during the summer at upstream stations, WA-3, -4 and -5, as well as downstream of the reservoir at station WA-1. Trends for total phosphorus, TDS, BOD, and total coliform were not significant.

4.3 TROPHIC STATE CLASSIFICATION

The trophic condition of F.E. Walter Reservoir was characterized as mesotrophic in 2002. The trophic status was defined independently by Carlson's trophic state indices and EPA criteria. Both classifications were based on concentrations of total phosphorus, chlorophyll *a* and secchi disk depths.

4.4 COLIFORM BACTERIA MONITORING

Coliform bacteria contamination at F. E. Walter Reservoir was in compliance with the PADEP water quality standard for bacteria contamination during 2002. The geometric means among samples collected each month were always less than 200 colonies/100-ml. Both regression and Mann-Kendall analyses indicated an increasing trend for fecal coliform downstream of the reservoir during summer. The Mann-Kendall also determined an increasing trend upstream on the Lehigh River (WA-3, -4, and -5) for fecal coliform during the summer.

4.5 SEDIMENT PRIORITY POLLUTANT MONITORING

F.E. Walter Reservoir was in compliance with NJDEP soil guidelines in 2002. Of the 93 priority pollutant contaminants analyzed in F.E. Walter Reservoir sediments, none were detected and all parameters were measured at levels below sediment screening levels.

4.6 DRINKING WATER MONITORING

F. E. Walter Reservoir drinking water was in compliance with PADEP drinking water standards for primary and secondary and bacteria with the exception of pH and

manganese. Manganese concentration of 0.053 mg/L exceeded the PADEP drinking water standards by 0.007 and 0.011-mg/L. Measures of pH were less than the standard range of 6.5 to 8.5.

4.7 ADDITIONAL WATER QUALITY MONITORING ALONG THE LEHIGH RIVER

Water quality monitoring at five Lehigh River monitoring stations were examined and compared to PADEP water use criteria for temperature, DO, pH, and turbidity. Stations along the Lehigh were WA1 (just below the F. E. Walter dam outfall), LH3 (Tannery Bridge), LH10 (Lehighton), LH15 (Walnutport Gauge), and LH17 (Northampton). Stations LH-3 and LH-10 were below the standard on 22 October with measures of 5.85 and 5.84 respectively

4.8 HYDROGEN SULFIDE AND DISSOLVED METAL MONITORING

Hydrogen Sulfide and dissolved metals were monitored in F.E. Walter Reservoir and at two downstream stations on 7 August and 5 September. Hydrogen sulfide was only detected in August and ranged from less than the detection limit of 0.025-mg/L to 1.6-mg/L. None of the dissolved metals exceeded the PADEP Fish and Aquatic Life Continuous or Maximum Concentration criteria.

4.9 TEMPERATURE PROBE MONITORING

Daily mean temperatures calculated from the data recorded by the TidbiT™ probes deployed at five Lehigh River monitoring stations were examined and compared to PADEP water use criteria for temperature. The analysis indicated that stations WA1, LH3, and LH10 were not in compliance with temperature requirements for a High Quality Cold Water Fisheries for most of monitoring period. Additionally, stations LH15 and LH17, with a few exceptions in the summer months, met the PADEP requirements for a Cold Water Fishery.

