

Alabama Department of Environmental Management

Fish Tissue Monitoring Program

Background

The Alabama Department of Environmental Management (ADEM) and its predecessor, the Alabama Water Improvement Commission (AWIC), have collected fish for analysis of contaminant levels since 1970. For the 20 years that followed, fish collections focused on areas of known or suspected contamination. In 1991, the ADEM expanded its Fish Tissue Monitoring Program (FTMP) to provide statewide screening of bioaccumulative contaminants in fish tissue, and to provide the Alabama Department of Public Health (ADPH) with data needed for determination of potential risk to those who consume fish from Alabama waters. The expanded program historically exists as a cooperative effort between the ADEM, the Alabama Department of Public Health (ADPH), the Alabama Department of Conservation and Natural Resources (ADCNR), and the Tennessee Valley Authority (TVA).

Following expansion of the program to statewide screening, fish from all of Alabama's major reservoirs, rivers, streams, and state-managed public fishing lakes have been collected. Data from these locations are provided to the ADPH for issuance, modification, or removal of fish consumption advisories to the public. To date, samples comprised of several thousand fish have been collected from more than 300 sites for the FTMP.



Objectives

Because of the variability in contaminant concentrations observed in fish collected from locations over several years, and the need for additional monitoring at a number of locations, the approach to annual monitoring was refined in 2002. Annual fish tissue monitoring by ADEM became multi-faceted and directed toward accomplishing four objectives:

- a) sampling locations throughout the focus basin (Tier I basin screening);
- b) repetitive sampling of sites where the ADPH has determined that FDA limits have been exceeded (Tier II known impact);
- c) sampling of sites in south Alabama that have not been sampled in several years (Tier I screening); and,

- d) sampling remaining areas in south Alabama where fish have not been collected for the FTMP (Tier I screening).

Repetitive sampling of sites where FDA action levels have been exceeded proceed as follows:

- a) Sites that exceeded FDA limits for the first time the previous year will be sampled for a minimum of two concurrent years to provide verification of contaminant concentrations as requested by the ADPH;
- b) Sites where ADPH consumption advisories currently exist will be sampled at a minimum of every three years to provide data for analysis of trends in contaminant concentrations.

Design

In 1997, the FTMP was incorporated into the ADEM Watershed Management Approach. Pursuant to this approach, water quality of each major drainage basin in the state is assessed by ADEM on a five-year rotating basis. In addition to the basin locations sampled each year, the ADEM continues to sample areas of concern outside the focus basin as needed and/or requested by cooperating agencies and as resources allow. The ADEM also continues to monitor dioxin concentrations below paper mills.

The number of sampling locations each year typically varies from forty to fifty stations, consisting of a mix of Tier I stations (screening, basin and south Alabama) and Tier II stations (FDA limit exceedance sites). The number of fish collected each year typically ranges from 480-500. Stations sampled and numbers of fish collected vary according to the size of the basin, number of Tier II sites, and resources available in a given year.

Sampling is typically conducted in the fall of the year, generally October-December for the FTMP. These months are preferred in fish tissue monitoring programs because:

- a) Organic pollutants, primarily stored in fatty (lipid) tissue, would be at the greatest concentration as fat content of fish is highest at this time of year;
- b) Target species are more easily collected while water levels are low and as water temperatures cool;
- c) Fall collections do not interfere with spawning seasons of target species.

Collection methods may include electrofishing and/or gillnets as needed. At each location, six individuals of the same species are collected from each of two primary feeding groups, predators and bottom-feeders. Where mercury contamination is the primary concern, only predator species may be collected if resources are limited.

Collected fish are within a size range identified in the SOP, with the additional requirement that catfish weigh a minimum of one pound as requested by the ADPH.

Collected fish at each location may be analyzed as species-specific composite samples (Tier I screening), or as individuals (Tier II known impact) when more definitive contaminant concentration data in fish is needed from an impacted site. Following completion of analyses, all data are compiled and distributed to cooperating agencies and a press release issued to provide analytical results to the public.

Core and Supplemental Water Quality Indicators

Core Indicators: Arsenic, cadmium, lead, mercury, selenium, chlordane, chlorpyrifos, 4,4-DDD, 4,4-DDE, 4,4-DDT, 2,4-DDD, 2,4-DDE, 2,4-DDT, dieldrin, endosulfan I, endosulfan II, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, lindane, mirex, toxaphene, PCBs, dioxin, relative weight.

Supplemental Indicators: As needed on a Tier II basis.

ADEM website,
<http://www.adem.state.al.us/FieldOps/Monitoring/SurfaceStrategies/FishTissue.htm>,
03 July 2007.