

Organochlorine Compounds and Trace Elements in Fish Tissue and Ancillary Data for the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

By JAMES F. COLES

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FOREWORD

The mission of the U.S. Geological Survey (USGS) is to assess the quantity and quality of the earth resources of the Nation and to provide information that will assist resource managers and policymakers at Federal, State, and local levels in making sound decisions. Assessment of water-quality conditions and trends is an important part of this overall mission.

One of the greatest challenges faced by water-resources scientists is acquiring reliable information that will guide the use and protection of the Nation's water resources. That challenge is being addressed by Federal, State, interstate, and local water-resource agencies and by many academic institutions. These organizations are collecting water-quality data for a host of purposes that include: compliance with permits and water-supply standards; development of remediation plans for specific contamination problems; operational decisions on industrial, wastewater, or water-supply facilities; and research on factors that affect water quality. An additional need for water-quality information is to provide a basis on which regional- and national-level policy decisions can be based. Wise decisions must be based on sound information. As a society we need to know whether certain types of water-quality problems are isolated or ubiquitous, whether there are significant differences in conditions among regions, whether the conditions are changing over time, and why these conditions change from place to place and over time. The information can be used to help determine the efficacy of existing water-quality policies and to help analysts determine the need for and likely consequences of new policies.

To address these needs, the U.S. Congress appropriated funds in 1986 for the USGS to begin a pilot program in seven project areas to develop and refine the National Water-Quality Assessment (NAWQA) Program. In 1991, the USGS began full implementation of the program. The NAWQA Program builds upon an existing base of water-quality studies of the USGS, as well as those of other Federal, State, and local agencies. The objectives of the NAWQA Program are to:

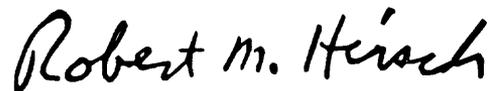
- Describe current water-quality conditions for a large part of the Nation's freshwater streams, rivers, and aquifers.
- Describe how water quality is changing over time.
- Improve understanding of the primary natural and human factors that affect water-quality conditions.

This information will help support the development and evaluation of management, regulatory, and monitoring decisions by other Federal, State, and local agencies to protect, use, and enhance water resources.

The goals of the NAWQA Program are being achieved through ongoing and proposed investigations of 60 of the Nation's most important river basins and aquifer systems, which are referred to as study units. These study units are distributed throughout the Nation and cover a diversity of hydrogeologic settings. More than two-thirds of the Nation's freshwater use occurs within the 60 study units and more than two-thirds of the people served by public water-supply systems live within their boundaries.

National synthesis of data analysis, based on aggregation of comparable information obtained from the study units, is a major component of the program. This effort focuses on selected water-quality topics using nationally consistent information. Comparative studies will explain differences and similarities in observed water-quality conditions among study areas and will identify changes and trends and their causes. The first topics addressed by the national synthesis are pesticides, nutrients, volatile organic compounds, and aquatic biology. Discussions on these and other water-quality topics will be published in periodic summaries of the quality of the Nation's ground and surface water as the information becomes available.

This report is an element of the comprehensive body of information developed as part of the NAWQA Program. The program depends heavily on the advice, cooperation, and information from many Federal, State, interstate, Tribal, and local agencies and the public. The assistance and suggestions of all are greatly appreciated.



Robert M. Hirsch
Chief Hydrologist

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CONVERSION FACTORS

| Multiply | By | To obtain |
|--------------------------------|-------|------------------|
| inch (in.) | 25.40 | millimeter |
| ounce (oz) | 28.35 | gram |
| square mile (mi ²) | 2.590 | square kilometer |

Organochlorine Compounds and Trace Elements in Fish Tissue and Ancillary Data for the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

By James F. Coles

Abstract

Concentrations of organochlorine compounds and trace elements were assayed in fish tissue collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94. These data were collected to determine the occurrence and distribution of organochlorine compounds and trace elements in the study unit. Ancillary data included are land-use categories by percentage of the sampling-site basins and the size, gender, and age of the individual fish collected for this study. Concentrations of 28 organochlorine compounds in composited whole fish samples were measured at 32 sites, and concentrations of 22 trace elements in composited fish liver samples were measured at 14 of the 32 sites. Most frequently detected organochlorines were DDT related compounds at 31 sites, total PCBs at 28 sites, and chlordane related compounds at 25 sites. Concentrations of total PCBs in fish tissue were generally higher at the large river sites than at the smaller tributary sites. Concentrations of chlordane-related compounds in fish tissue were higher at sites from more urbanized basins than at sites from predominately agriculture and forested basins. Concentrations of the DDT related compounds were undifferentiated among sites comprising different land uses. Trace elements detected at all 14 sites included boron, copper, iron, manganese, molybdenum, selenium, and zinc. Trace elements detected at 10 or more sites included arsenic, mercury, silver, strontium, and vanadium. Antimony, beryllium, and uranium were not detected at any site.

INTRODUCTION

This study was done as part of the U.S. Geological Survey's National Water Quality Assessment (NAWQA) Program, which uses an integrated approach of investigating physical, chemical, and biological components of an aquatic system to assess water quality on a basin-wide scale (Gurtz, 1994). The Program component addressed by this study is the NAWQA Study of Contaminants in Biological Tissues, which has the objectives of determining the occurrence and spatial distribution of contaminants in a study unit (Crawford and Luoma, 1993). These objectives are met by measuring contaminant concentrations in tissues of aquatic organisms that are known to bioaccumulate organochlorine compounds and trace elements. From a national perspective, no single aquatic species could serve as an appropriate bioassessment organism for evaluating contaminants in tissues from all study units, given the diversity of freshwater environments and aquatic species among the NAWQA study units. The taxon selected for evaluating contaminants in a study unit needs to be as consistent as possible to provide valid comparisons among sampling sites. A National target taxa list was developed for the NAWQA program, which includes fish, mollusk, aquatic insect, and vascular plant species that bioaccumulate contaminants (Crawford and Luoma, 1993). The appropriate taxon selected for the Study of Contaminants in Biological Tissues in each study unit is determined by what aquatic organisms are prevalent in a study unit that are among the National target taxa list. The basis of this approach is to achieve comparability among environments in study units across the Nation (Crawford and Luoma, 1993).

The basin which comprises the area in which this study was done is the Connecticut, Housatonic, and Thames River Basins Study Unit, which includes all drainage basins flowing into Long Island Sound from the coast of Connecticut. The study area includes eastern Vermont, western New Hampshire, west-central Massachusetts, nearly all of Connecticut, and small parts of New York and Rhode Island—an area of about 15,750 mi² (Grady and Garabedian, 1991). Although occupying less than 0.5 percent of the total area of the Nation, the study area is inhabited by about 4.5 million people—about 2 percent of the Nation's population (Grady and Garabedian, 1991).

A field reconnaissance of rivers at U.S. Geological Survey (USGS) gaging stations in the study area during the summer of 1992 showed that the sucker (*Catostomus* sp.)—a priority taxon from the National target taxa list—was prevalent throughout the region. Consequently, the sucker was selected as the organism for contaminant assessment in tissue for this study area. The study was conducted during the post-spawning period of the sucker under low-flow conditions (late June to early November) from 1992 to 1994. Sampling sites were selected for spatial distribution throughout the study area, and from basins of varying sizes and land uses. The distribution of sites was concentrated in the southern part of the study area where rivers are more greatly affected by human activity. Sites were selected along a longitudinal gradient on the larger rivers of the study area to determine if contaminant concentrations changed as the rivers flowed through more densely populated areas. Using these criteria, 32 sites were selected and separated into four groups by river basin—Thames River, Connecticut River, Housatonic River, and Long Island Sound Coastal Rivers (fig. 1, table 1).

METHODS

Collection of Fish Tissue Samples

Fish were collected at 32 sites for organochlorine compound analysis in whole fish tissue and separate fish were collected at 14 of these sites for trace-element analysis in fish liver tissue (table 1). Sample replicates

for organochlorine-compound and trace-element analyses were collected at two sites—the Connecticut River near Longmeadow, Mass. (fig. 1, map no. 13) and the Connecticut River near Portland, Conn. (fig. 1, map no. 21). Fish were captured using an electrofishing backpack unit at wadable sites and with an electrofishing boat at large-river mainstem sites (map nos. 4, 5, 7, 9, 13, 21, 23, and 27). The most mature individuals were selected for contaminant analyses during the collection effort because these fish would have had a longer exposure period for bioaccumulation. The white sucker (*Catostomus commersoni*) was collected for analysis at 31 sites, and the longnose sucker (*Catostomus catostomus*) was collected at 1 site, the Sleepers River near St. Johnsbury, Vermont (fig. 1, map no. 6). The white sucker was not encountered at the Sleepers River, but because the longnose sucker is the same genus (*Catostomus*), it was deemed an appropriate alternative for data comparison among sites.

Fish were processed in the field to be shipped for laboratory analysis following established NAWQA guidelines (Crawford and Luoma, 1993). Prior to tissue sample preparation, each fish was pithed, weighed, and measured (total and standard lengths), and the left pectoral fin ray was removed for age determination using the method of Deelder and Willemse (1973). The gender of the fish was then determined by opening the body cavity with a scalpel and examining the gonads. The fish tissue sample prepared for organochlorine compound analysis consisted of a composite of five to eight whole fish that were wrapped in aluminium foil, packed on dry ice, and shipped to the laboratory for analyses. The fish tissue sample prepared for trace-element analysis consisted of liver tissue dissected from eight fish and composited in a precleaned glass jar with a Teflon¹ cap, packed on dry ice, and shipped to the laboratory for analysis. At the 14 sites where concurrent samples were prepared for organochlorine-compound and trace-element analyses, separate fish were used for the two different analyses.

¹Use of brand names in this report is for identification purposes only and does not constitute endorsement by the U.S. Geological Survey.

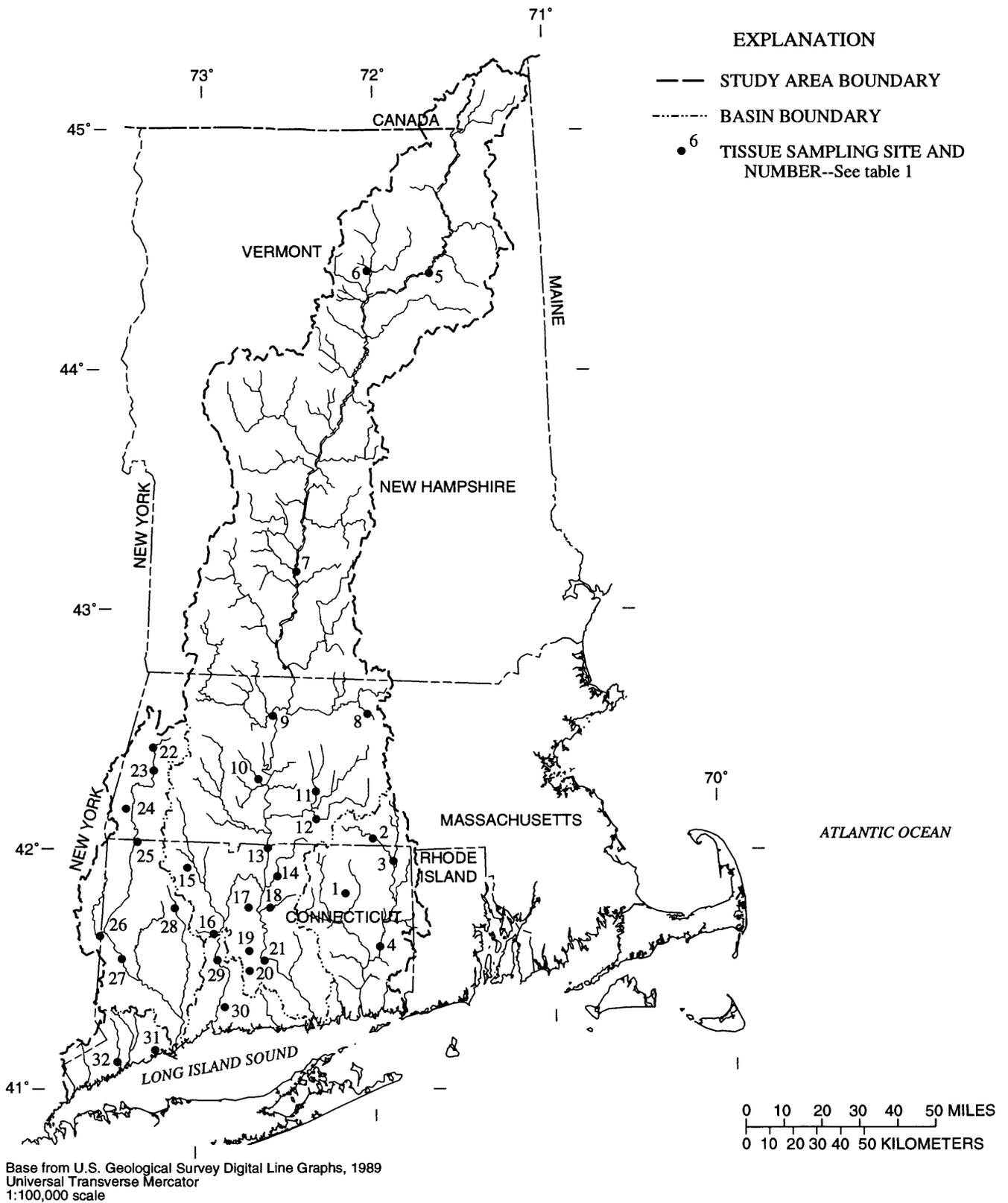


Figure 1. Location of sampling sites where fish were collected for contaminants analyses in tissue, Connecticut, Housatonic, and Thames River Basins Study Unit.

Table 1. Descriptions of sampling sites where fish were collected for contaminants analyses in tissue for the Connecticut, Housatonic, and Thames River Basins Study Unit

[Map No.: See figure 1 for location of sampling sites. No., number. Latitude and longitude are given in degrees, minutes, and seconds. Sample type: OC, organochlorine compound analysis in whole fish tissue; TE, trace-element analysis in fish liver tissue]

| Map No. | Station No. or site identification No. | Site name | Latitude ° ' " | Longitude ° ' " | Sample type |
|---|--|--|-------------------|--------------------|-------------|
| Thames River Basin | | | | | |
| 1 | 01121000 | Mount Hope River near Warrentonville, CT | 41 50 37 | 72 10 10 | OC |
| 2 | 420420072010001 | Quinebaug River at Sandersdale, MA | 42 04 18 | 72 00 55 | OC |
| 3 | 01125100 | French River at North Grosvenordale, CT | 41 58 41 | 71 54 03 | OC |
| 4 | 01126850 | Quinebaug River at Clayville, CT | 41 37 18 | 71 58 51 | OC,TE |
| Connecticut River Basin | | | | | |
| 5 | 01131400 | Connecticut River near Lancaster, NH | 44 25 32 | 71 40 38 | OC,TE |
| 6 | 01135300 | Sleepers River near St. Johnsbury, VT | 44 26 04 | 72 02 22 | OC,TE |
| 7 | 01153150 | Connecticut River at South Charlestown, NH | 43 11 00 | 72 26 34 | OC,TE |
| 8 | 01163200 | Otter River at Otter River, MA | 42 35 18 | 72 02 29 | OC |
| 9 | 01170500 | Connecticut River at Montague City, MA | 42 34 45 | 72 34 30 | OC,TE |
| 10 | 01171500 | Mill River at Northampton, MA | 42 19 05 | 72 39 21 | OC |
| 11 | 01175500 | Swift River at West Ware, MA | 42 16 04 | 72 19 59 | OC |
| 12 | 420910072200001 | Quaboag River at Palmer, MA | 42 09 10 | 72 19 53 | OC |
| 13 | 01183850 | Connecticut River near Longmeadow, MA | 42 01 53 | 72 36 14 | OC,TE |
| 14 | 01184490 | Broad Brook at Broad Brook, CT | 41 54 50 | 72 33 00 | OC,TE |
| 15 | 415645073025001 | Still River at Nelsons Corner, CT | 41 56 55 | 73 02 58 | OC |
| 16 | 01189000 | Pequabuck River at Forestville, CT | 41 40 23 | 72 54 04 | OC,TE |
| 17 | 01191000 | North Branch Park River at Hartford, CT | 41 47 03 | 72 42 31 | OC |
| 18 | 01192500 | Hockanum River near East Hartford, CT | 41 46 59 | 72 35 21 | OC,TE |
| 19 | 413615072423001 | Mattabeset River at Little River, CT | 41 36 09 | 72 42 29 | OC |
| 20 | 01192883 | Coginchaug River at Middlefield, CT | 41 31 12 | 72 42 23 | OC |
| 21 | 01192990 | Connecticut River near Portland, CT | 41 33 46 | 72 37 24 | OC,TE |
| Housatonic River Basin | | | | | |
| 22 | 422640073144501 | East Branch Housatonic River at Pittsfield, MA | 42 26 43 | 73 14 40 | OC |
| 23 | 422102073142201 | Housatonic River (Woods Pond) at Lenox, MA | 42 21 02 | 73 14 22 | OC |
| 24 | 01198000 | Green River at Great Barrington, MA | 42 11 31 | 73 23 28 | OC |
| 25 | 01198200 | Konkapot River at Ashley Falls, MA | 42 03 11 | 73 19 35 | OC |
| 26 | 01200000 | Tenmile River near Gaylordsville, CT | 41 39 32 | 73 31 44 | OC,TE |
| 27 | 01201335 | Housatonic River near Town Hill, CT | 41 33 51 | 73 24 33 | OC,TE |
| 28 | 414640073071001 | West Branch Naugatuck River at Torrington, CT | 41 46 44 | 73 07 06 | OC |
| Long Island Sound Coastal River Basins | | | | | |
| 29 | 413345072531001 | Quinnipiac River at Stillmans Corner, CT | 41 33 48 | 72 52 54 | OC |
| 30 | 01196580 | Muddy River near North Haven, CT | 41 22 07 | 72 50 31 | OC |
| 31 | 01208869 | Rooster River near Fairfield, CT | 41 11 19 | 73 13 18 | OC,TE |
| 32 | 01209710 | Norwalk River at Winnipauk, CT | 41 08 07 | 73 25 36 | OC,TE |

Sample Analysis

All samples were analyzed at the USGS National Water Quality Laboratory (NWQL) in Arvada, Colorado. Twenty-eight organochlorine compounds were analyzed using dual column gas chromatography with electron capture detection (table 2). The method used by the NWQL for organochlorine compound analysis in aquatic tissues is explained in Leiker and

others (1995). Twenty-two trace elements were analyzed using one of three instruments, depending on the element; inductively coupled plasma mass spectrometry (ICP-MS), inductively coupled plasma atomic emission spectrometry (ICP-AES), and cold vapor atomization atomic absorption (CVA-AA) (table 2). The methods used by the NWQL for analysis for trace-element analysis in aquatic tissues are explained in Hoffman (1996).

Table 2. Method of analysis and reporting limits for organochlorine compounds and trace elements in fish tissue for samples collected from the Connecticut, Housatonic, and Thames River Basins Study Unit

[**Analysis instruments:** CVA-AA, cold vapor atomization atomic absorption; ECD-GC, electron capture detection gas chromatography; ICP-AES, inductively coupled plasma atomic emission spectrometry; ICP-MS, inductively coupled plasma mass spectrometry. **Reporting limit:** micrograms per kilograms, wet weight for organochlorine compounds and micrograms per gram dry weight for trace elements]

| Constituent | Analysis instrument | Reporting limit | Constituent | Analysis instrument | Reporting limit |
|---------------------------------|---------------------|-----------------|---|---------------------|-----------------|
| Organochlorine compounds | | | Organochlorine compounds—Continued | | |
| PCBs, total | ECD-GC | 50 | Oxychlorane | ECD-GC | 5.0 |
| Aldrin | ECD-GC | 5.0 | Pentachloroanisole | ECD-GC | 5.0 |
| <i>alpha</i> -BHC | ECD-GC | 5.0 | Toxaphene | ECD-GC | 200 |
| <i>beta</i> -BHC | ECD-GC | 5.0 | Trace elements | | |
| <i>delta</i> -BHC | ECD-GC | 5.0 | Aluminum | ICP-AES | 1.000 |
| <i>cis</i> -Chlordane | ECD-GC | 5.0 | Antimony | ICP-MS | .100 |
| <i>trans</i> -Chlordane | ECD-GC | 5.0 | Arsenic | ICP-MS | .100 |
| DCPA (Dacthal) | ECD-GC | 5.0 | Barium | ICP-AES | .100 |
| <i>o,p'</i> -DDD | ECD-GC | 5.0 | Beryllium | ICP-MS | .100 |
| <i>p,p'</i> -DDD | ECD-GC | 5.0 | Boron | ICP-AES | .200 |
| <i>o,p'</i> -DDE | ECD-GC | 5.0 | Cadmium | ICP-MS | .100 |
| <i>p,p'</i> -DDE | ECD-GC | 5.0 | Chromium | ICP-AES | .500 |
| <i>o,p'</i> -DDT | ECD-GC | 5.0 | Cobalt | ICP-MS | .100 |
| <i>p,p'</i> -DDT | ECD-GC | 5.0 | Copper | ICP-AES | .500 |
| Dieldrin | ECD-GC | 5.0 | Iron | ICP-AES | 1.000 |
| Endrin | ECD-GC | 5.0 | Lead | ICP-MS | .100 |
| Heptachlor | ECD-GC | 5.0 | Manganese | ICP-AES | .100 |
| Heptachlor epoxide | ECD-GC | 5.0 | Mercury | CVA-AA | .100 |
| Hexachlorobenzene | ECD-GC | 5.0 | Molybdenum | ICP-MS | .100 |
| Lindane | ECD-GC | 5.0 | Nickel | ICP-MS | .100 |
| <i>o,p'</i> -Methoxychlor | ECD-GC | 5.0 | Selenium | ICP-MS | .100 |
| <i>p,p'</i> -Methoxychlor | ECD-GC | 5.0 | Silver | ICP-MS | .100 |
| Mirex | ECD-GC | 5.0 | Strontium | ICP-AES | .100 |
| <i>cis</i> -Nonachlor | ECD-GC | 5.0 | Uranium | ICP-MS | .100 |
| <i>trans</i> -Nonachlor | ECD-GC | 5.0 | Vanadium | ICP-MS | .100 |
| | | | Zinc | ICP-AES | .500 |

CONTAMINANTS IN FISH TISSUE

Organochlorine Compounds

Concentrations of organochlorine compounds by sampling site are given as micrograms per kilogram ($\mu\text{g}/\text{kg}$) wet weight in composite samples of whole fish tissue (table 7, at back of report). Values where the reporting limit of a compound is higher than reporting limits shown in table 2 were due to interference from co-eluting compounds during the sample analysis run, which effectively raised the reporting limit of the compound being assayed. *p,p'*-DDD concentrations reported as -99999 (missing value) indicate co-eluting interference where a higher reporting limit was not determined. A summary of organochlorine compounds for the number of sampling sites with detections greater than the reporting limits is shown in table 3. Comparison of the replicate tissue samples taken from the Connecticut River mainstem sites (map nos. 13 and 21) indicate that concentrations of organochlorine compounds differed by no more than 33 percent between the site-specific replicates.

Total PCB was detected at 28 of the 32 sampling sites. At most sites, total PCB concentration was the highest of the organochlorine compounds detected, having a median value of 350 $\mu\text{g}/\text{kg}$ among the 28 sites with detections. Total PCB concentrations in fish tissue were highest at the three sampling sites on the Housatonic River, where concentrations exceeded 10,000 $\mu\text{g}/\text{kg}$ (table 7, map nos. 22, 23, and 27). Two classes of organochlorine pesticides which were predominant in samples at most sampling sites were the DDT related compounds and the chlordane related compounds. The DDT related compounds that were detected include the *o,p'*- and *p,p'*-homologs of DDT, DDE, and DDD; *p,p'*-DDE was detected at 31 of the 32 sampling sites. The chlordane related compounds that were detected include the *cis*- and *trans*-isomers of chlordane and nonachlor, oxychlordane, and heptachlor epoxide; *trans*-nonachlor was detected at 25 of the 32 sampling sites.

Trace Elements

Trace-element concentrations by sampling site are given as micrograms per gram ($\mu\text{g}/\text{g}$) dry weight in composite samples of fish liver tissue (table 4). Values

where the reporting limit of a trace element is higher than shown in table 2 were due to a relatively small tissue sample size submitted for analysis, typically less than 10 grams. Under these conditions, the analytical capability of measuring a trace element at low concentrations is reduced and the reporting limit consequently increases. A summary of trace elements for the number of sampling sites with detections greater than the reporting limits is shown in table 5. Trace elements detected at all 14 sites included boron, copper, iron, manganese, molybdenum, selenium, and zinc.

Table 3. Summary of organochlorine-compound concentrations for number of sampling sites with detections greater than the reporting limit, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[Concentrations are in micrograms per kilogram, wet weight. --, no data]

| Organochlorine compound | Number of sites with detections | Minimum | Maximum | Median |
|--------------------------------|---------------------------------|---------|---------|--------|
| PCBs, total..... | 28 | 50 | 72,000 | 350 |
| Aldrin | 0 | -- | -- | -- |
| <i>alpha</i> -BHC | 0 | -- | -- | -- |
| <i>beta</i> -BHC | 0 | -- | -- | -- |
| <i>delta</i> -BHC | 0 | -- | -- | -- |
| <i>cis</i> -Chlordane | 21 | 5.7 | 150 | 16 |
| <i>trans</i> -Chlordane..... | 11 | 5.3 | 40 | 8.4 |
| DCPA (Dacthal) | 0 | -- | -- | -- |
| <i>o,p'</i> -DDD | 7 | 5.1 | 9.8 | 5.3 |
| <i>p,p'</i> -DDD | 23 | 5.7 | 100 | 20 |
| <i>o,p'</i> -DDE | 4 | 6.0 | 8.4 | 7.2 |
| <i>p,p'</i> -DDE | 31 | 8.1 | 250 | 52 |
| <i>o,p'</i> -DDT | 2 | 5.2 | 18 | 11.6 |
| <i>p,p'</i> -DDT | 21 | 5.6 | 33 | 14 |
| Dieldrin | 13 | 5.4 | 140 | 10 |
| Endrin..... | 0 | -- | -- | -- |
| Heptachlor..... | 0 | -- | -- | -- |
| Heptachlor epoxide ... | 1 | 24 | 24 | 24 |
| Hexachlorobenzene ... | 2 | 9.1 | 15 | 12 |
| Lindane..... | 0 | -- | -- | -- |
| <i>o,p'</i> -Methoxychlor..... | 0 | -- | -- | -- |
| <i>p,p'</i> -Methoxychlor..... | 0 | -- | -- | -- |
| Mirex | 0 | -- | -- | -- |
| <i>cis</i> -Nonachlor | 12 | 5.7 | 37 | 9.1 |
| <i>trans</i> -Nonachlor | 25 | 5.0 | 120 | 17 |
| Oxychlordane | 12 | 5.2 | 22 | 7.85 |
| Pentachloroanisole | 7 | 6.7 | 24 | 14 |
| Toxaphene | 0 | -- | -- | -- |

Table 4. Concentrations of selected trace elements in composite samples of fish liver tissue collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[Concentrations are in microgram per gram dry weight, unless otherwise noted. Map No.: See figure 1 for location of sampling sites. No., number. Less than values (<) represent the reporting limits. Values where the reporting limits are higher than the standard reporting limits were due to relatively small sample sizes (typically < 10 grams), which effectively reduced the analytical capability of measuring a trace element at low concentrations]

| Map No. | Station No. | Sample date | Water (percent) | Aluminum | Antimony | Arsenic | Barium | Beryllium | Boron | Cadmium |
|---|-------------|-------------|-----------------|----------|----------|---------|--------|-----------|-------|---------|
| Thames River Basin | | | | | | | | | | |
| 4 | 01126850 | 7-20-93 | 73 | 3.3 | <0.2 | 0.3 | <0.1 | <0.2 | 0.8 | 1.2 |
| Connecticut River Basin | | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | 76 | 5.0 | <0.2 | 0.2 | <0.1 | <.2 | 0.7 | 0.8 |
| 6 | 01135300 | 8-05-93 | 72 | 1.7 | <.2 | <.2 | .4 | <.2 | 1.8 | .2 |
| 7 | 01153150 | 7-16-93 | 69 | 2.1 | <.2 | .2 | <.1 | <.2 | .6 | 3.2 |
| 9 | 01170500 | 7-15-93 | 68 | 2.7 | <.2 | .5 | <.1 | <.2 | .4 | 1.6 |
| 13 | 01183850 | 7-14-93 | 76 | 3.5 | <.2 | .4 | <.1 | <.2 | 1.9 | 4.4 |
| | Replicate | 7-14-93 | 67 | <1.0 | <.1 | .4 | <.1 | <.1 | .9 | 1.6 |
| 14 | 01184490 | 10-23-92 | 76 | <1.0 | <.3 | <.3 | <.1 | <.3 | .7 | <.3 |
| 16 | 01189000 | 11-17-92 | 72 | <1.0 | <.1 | <.1 | <.1 | <.1 | .4 | 5.0 |
| 18 | 01192500 | 10-22-92 | 77 | <1.0 | <.4 | <.4 | .2 | <.4 | 1.2 | .9 |
| 21 | 01192990 | 7-13-93 | 62 | 1.3 | <.1 | .3 | <.1 | <.1 | .4 | 2.1 |
| | Replicate | 7-13-93 | 72 | 2.2 | <.2 | .4 | <.1 | <.2 | 1.1 | 4.5 |
| Housatonic River Basin | | | | | | | | | | |
| 26 | 01200000 | 10-20-92 | 78 | <1.0 | <0.3 | 0.3 | <0.1 | <0.3 | 1.9 | 0.3 |
| 27 | 01201335 | 7-21-93 | 74 | <1.0 | <.2 | .2 | <.1 | <.2 | .8 | .6 |
| Long Island Sound Coastal River Basins | | | | | | | | | | |
| 31 | 01208869 | 6-29-93 | 70 | 1.1 | <0.2 | 0.2 | 0.1 | <0.2 | 1.0 | 1.4 |
| 32 | 01209710 | 10-20-92 | 77 | <1.0 | <.2 | .3 | <.1 | <.2 | 1.4 | .2 |

| Map No. | Station No. | Sample date | Chromium | Cobalt | Copper | Iron | Lead | Manganese | Mercury | Molybdenum |
|---|-------------|-------------|----------|--------|--------|-------|------|-----------|---------|------------|
| Thames River Basin | | | | | | | | | | |
| 4 | 01126850 | 7-20-93 | <0.5 | 0.3 | 40 | 1,200 | 0.3 | 4.7 | 0.4 | 1.1 |
| Connecticut River Basin | | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | <0.5 | 0.2 | 36 | 460 | <0.2 | 5.8 | 1.0 | 1.5 |
| 6 | 01135300 | 8-05-93 | <.5 | <.2 | 11 | 210 | <.2 | 12 | <.1 | .7 |
| 7 | 01153150 | 7-16-93 | <.5 | .3 | 32 | 420 | <.2 | 4.0 | .9 | .9 |
| 9 | 01170500 | 7-15-93 | <.5 | <.2 | 19 | 480 | <.2 | 4.1 | .4 | .6 |
| 13 | 01183850 | 7-14-93 | .5 | .5 | 60 | 530 | .2 | 5.6 | .5 | 1.3 |
| | Replicate | 7-14-93 | <.5 | .2 | 28 | 390 | <.1 | 3.6 | .2 | .6 |
| 14 | 01184490 | 10-23-92 | .7 | <.3 | 44 | 250 | <.3 | 8.1 | .1 | 3.5 |
| 16 | 01189000 | 11-17-92 | .6 | .2 | 39 | 340 | .3 | 5.6 | .1 | 2.9 |
| 18 | 01192500 | 10-22-92 | .7 | <.4 | 78 | 820 | <.4 | 10.3 | .3 | 4.0 |
| 21 | 01192990 | 7-13-93 | <.5 | .2 | 19 | 440 | .1 | 2.6 | <.1 | .5 |
| | Replicate | 7-13-93 | <.5 | .3 | 47 | 880 | .3 | 3.9 | .5 | .8 |
| Housatonic River Basin | | | | | | | | | | |
| 26 | 01200000 | 10-20-92 | 0.8 | <0.3 | 79 | 200 | <0.3 | 13.6 | 0.1 | 4.9 |
| 27 | 01201335 | 7-21-93 | <.5 | <.2 | 40 | 520 | <.2 | 5.9 | .9 | 1.4 |
| Long Island Sound Coastal River Basins | | | | | | | | | | |
| 31 | 01208869 | 6-29-93 | <0.5 | <0.2 | 25 | 330 | 0.2 | 4.8 | 0.2 | 0.7 |
| 32 | 01209710 | 10-20-92 | .6 | <.2 | 35 | 260 | <.2 | 9.3 | <.1 | 2.1 |

Table 4. Concentrations of selected trace elements in composite samples of fish liver tissue collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. | Sample date | Nickel | Selenium | Silver | Strontium | Uranium | Vanadium | Zinc |
|---|-------------|-------------|--------|----------|--------|-----------|---------|----------|------|
| Thames River Basin | | | | | | | | | |
| 4 | 01126850 | 7-20-93 | <0.2 | 3.5 | 0.4 | 0.2 | <0.2 | 0.6 | 96 |
| Connecticut River Basin | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | <0.2 | 4.5 | 0.4 | 0.2 | <0.2 | 0.6 | 95 |
| 6 | 01135300 | 8-05-93 | <.2 | 2.7 | <.2 | .6 | <.2 | <.2 | 60 |
| 7 | 01153150 | 7-16-93 | <.2 | 3.8 | .4 | .1 | <.2 | .5 | 83 |
| 9 | 01170500 | 7-15-93 | <.2 | 2.8 | <.2 | .1 | <.2 | .4 | 57 |
| 13 | 01183850 | 7-14-93 | .2 | 6.2 | 1.1 | .2 | <.2 | 1.0 | 120 |
| | Replicate | 7-14-93 | <.1 | 1.5 | .3 | .2 | <.1 | .5 | 65 |
| 14 | 01184490 | 10-23-92 | .7 | 3.5 | <.3 | .2 | <.3 | .6 | 120 |
| 16 | 01189000 | 11-17-92 | .6 | 3.1 | .2 | <.1 | <.1 | .4 | 100 |
| 18 | 01192500 | 10-22-92 | <.4 | 4.3 | 1.3 | .2 | <.4 | .9 | 150 |
| 21 | 01192990 | 7-13-93 | <.1 | 1.6 | .2 | .1 | <.1 | .3 | 52 |
| | Replicate | 7-13-93 | <.2 | 3.5 | .5 | .2 | <.2 | .8 | 100 |
| Housatonic River Basin | | | | | | | | | |
| 26 | 01200000 | 10-20-92 | 0.3 | 2.6 | 1.3 | 0.1 | <0.3 | 0.5 | 110 |
| 27 | 01201335 | 7-21-93 | <.2 | 3.7 | .5 | <.1 | <.2 | .4 | 99 |
| Long Island Sound Coastal River Basins | | | | | | | | | |
| 31 | 01208869 | 6-29-93 | <0.2 | 2.8 | <0.2 | 0.4 | <0.2 | 0.6 | 66 |
| 32 | 01209710 | 10-20-92 | <.2 | 3.1 | .8 | .2 | <.2 | .5 | 120 |

Table 5. Summary of trace-element concentrations for number of sampling sites with detections greater than the reporting limits, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[Concentration units are micrograms per gram, dry weight. Minimum and median concentrations are based solely on detects above reporting limits. --, no data]

| Trace element | Number of sites with detections | Minimum | Maximum | Median | Trace element | Number of sites with detections | Minimum | Maximum | Median |
|-----------------|---------------------------------|---------|---------|--------|-----------------|---------------------------------|---------|---------|--------|
| Aluminum..... | 8 | 1.1 | 5.0 | 2.4 | Lead | 5 | 0.1 | 0.3 | 0.2 |
| Antimony | 0 | -- | - | -- | Manganese | 14 | 2.6 | 13.6 | 5.7 |
| Arsenic | 10 | .2 | .5 | .3 | Mercury | 12 | .1 | 1.0 | .4 |
| Barium | 3 | .1 | .4 | .2 | Molybdenum..... | 14 | .5 | 4.9 | 1.35 |
| Beryllium | 0 | -- | -- | -- | Nickel..... | 4 | .2 | .7 | .45 |
| Boron | 14 | .4 | 1.9 | .8 | Selenium | 14 | 1.6 | 6.2 | 3.3 |
| Cadmium..... | 13 | .2 | 5.0 | 1.2 | Silver..... | 10 | .2 | 1.3 | .45 |
| Chromium..... | 6 | .5 | .8 | .65 | Strontium | 12 | .1 | .6 | .2 |
| Cobalt..... | 6 | .2 | .5 | .25 | Uranium | 0 | -- | -- | -- |
| Copper..... | 14 | 11 | 79 | 37.5 | Vanadium | 13 | .3 | 1.0 | .5 |
| Iron..... | 14 | 200 | 1,200 | 430 | Zinc | 14 | 52 | 150 | 97.5 |

Trace elements detected at 10 or more sites included arsenic, mercury, silver, strontium, and vanadium. Antimony, beryllium, and uranium were not detected at any site. Comparison of the replicate tissue samples taken from the Connecticut River mainstem sites (map nos. 13 and 21) showed an approximate two-fold difference in most trace-element concentrations between the site-specific replicates.

The number of trace elements detected in tissue samples from the large-river mainstem sites (map nos. 4, 5, 7, 9, 13, 21, and 27) ranged from 12 to 18. Among this group of sites, the fewest trace elements (12) were detected in the sample from the Housatonic River at Town Hill, Connecticut (map no. 27) and the most (18) from the Connecticut River at Longmeadow, Massachusetts (map no. 13). The number of trace elements detected in tissue samples from the wadable sites (map nos. 6, 14, 16, 18, 26, 31, and 32) ranged from 11 to 15. Among this group of sites, the fewest trace elements (11) were detected in the sample from the Sleepers River near St. Johnsbury, Vermont (map no. 6) and the most (15) from three of the sites: the Pequabuck River at Forestville, Connecticut (map no. 16), the Tenmile River near Gaylordsville, Connecticut (map no. 26), and the Rooster River near Fairfield, Connecticut (map no. 31).

ANCILLARY DATA

Fish Measurements

The standard length, total length, weight, gender, and age of the individual fish collected for the composite samples of five to eight whole fish submitted for organochlorine compound analysis are shown in table 8 (at back of report). Gender determination denoted by a question mark (?) indicates that gender was not apparent due to quiescent gonads. The 258 individual fish ranged in standard length from 145 to 440 millimeters (mm) and averaged 294 mm. The fish ranged in total length from 180 to 535 mm and averaged 359 mm. The fish ranged in weight from 59

to 1,760 grams (g) and averaged 562 g. All fish were believed to be sexually mature, ranging in age from 6 to 25 years and averaging 15.2 years. The gender determination of the fish indicated that 160 were females, 91 were males, and 7 were unknown.

Land Use

Land use for each sampling site was calculated using digital land-use and land-cover data extracted from the U.S. Geological Survey's Geographical Information Retrieval and Analysis System (GIRAS) (Mitchell and others, 1977), using 1:250,000 scale maps produced during the mid-1970s. The digital data were updated to include areas of recent urban/suburban development using 1990 population data (Hitt, 1994). The data extraction was based on the classification system and definitions of the Level II Land Use and Cover Classification (Anderson and others, 1976).

Drainage-basin characteristics for each sampling site are given as area in square miles and the percentage of land-use type based on Anderson Level II land-use classes (table 9, at back of report). A summary of the land-use categories for each sampling site subbasin, based on Anderson Level I land-use classes, is given as a percentage of agriculture, urban, forest, wetland, and water (table 6). The percentage of urban land use was highest at sampling site subbasins in the southern part of the study unit. The subbasin area of the southernmost sampling sites, the Rooster River near Fairfield, Connecticut (map no. 31) and the Norwalk River at Winnipauk, Connecticut (map no. 32) were among the most highly urbanized—97.4 and 50.4 percent, respectively. Five additional sampling sites (map nos. 16, 17, 18, 19, and 29) had subbasin areas more than one-third urbanized, all located in the central part of Connecticut. The subbasin area of the two northernmost sampling sites, the Connecticut River near Lancaster, New Hampshire (map no. 5) and the Sleepers River near St. Johnsbury, Vermont (map no. 6) were the least urbanized—0.5 and 0.2 percent, respectively.

Table 6. Summary of land-use categories of the sampling sites where fish were collected for contaminant analyses from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[Map No.: See figure 1 for location of sampling sites. No., number]

| Map No. | Station No. and site identification No. | Land-use categories in percentage of basin area | | | | | |
|---|---|---|-------|--------|---------|-------|-------|
| | | Agriculture | Urban | Forest | Wetland | Water | Other |
| Thames River Basin | | | | | | | |
| 1 | 01121000 | 11.5 | 2.6 | 83.5 | 0 | 2.1 | 0.3 |
| 2 | 420420072010001 | 7.4 | 11.4 | 70.9 | 7.4 | 2.5 | .4 |
| 3 | 01125100 | 5.2 | 17.4 | 68.8 | 1.2 | 5.7 | 1.7 |
| 4 | 01126850 | 11.7 | 8.6 | 73.0 | 2.6 | 2.4 | .8 |
| Connecticut River Basin | | | | | | | |
| 5 | 01131400 | 5.5 | 0.5 | 82.2 | 3.0 | 1.1 | 7.8 |
| 6 | 01135300 | 27.8 | .2 | 72.0 | 0 | 0 | 0 |
| 7 | 01153150 | 11.4 | 1.8 | 82.0 | 1.1 | 1.3 | 2.4 |
| 8 | 01163200 | 3.3 | 21.7 | 65.5 | 5.6 | 2.8 | 1.0 |
| 9 | 01170500 | 10.3 | 2.6 | 82.7 | 1.4 | 1.3 | 1.6 |
| 10 | 01171500 | 8.9 | 11.9 | 77.0 | 1.4 | .6 | .1 |
| 11 | 01175500 | 2.6 | .8 | 72.9 | 4.5 | 19.2 | 0 |
| 12 | 420910072200001 | 16.8 | 8.5 | 66.6 | 5.7 | 1.8 | .7 |
| 13 | 01183850 | 10.6 | 4.8 | 79.6 | 1.8 | 1.7 | 1.5 |
| 14 | 01184490 | 54.9 | 8.0 | 32.3 | 0 | 1.0 | 3.9 |
| 15 | 415645073025001 | 6.1 | 10.0 | 79.0 | .6 | 2.9 | 1.4 |
| 16 | 01189000 | 6.6 | 42.6 | 48.4 | 0 | 1.8 | .7 |
| 17 | 01191000 | 22.5 | 48.2 | 25.6 | 2.2 | 1.3 | .2 |
| 18 | 01192500 | 11.0 | 51.3 | 35.2 | .3 | 1.9 | .4 |
| 19 | 413615072423001 | 24.3 | 37.6 | 35.6 | 0 | 2.4 | 0 |
| 20 | 01192883 | 37.7 | 7.1 | 54.2 | 0 | .7 | .4 |
| 21 | 01192990 | 11.3 | 7.4 | 76.4 | 1.8 | 1.8 | 1.4 |
| Housatonic River Basin | | | | | | | |
| 22 | 422640073144501 | 7.6 | 18.5 | 66.1 | 5.8 | 1.2 | 0.9 |
| 23 | 422102073142201 | 10.3 | 19.1 | 64.3 | 3.9 | 1.9 | .4 |
| 24 | 01198000 | 20.9 | 4.3 | 72.7 | 1.7 | .4 | .1 |
| 25 | 01198200 | 12.9 | 3.0 | 80.6 | 1.5 | 1.4 | .5 |
| 26 | 01200000 | 41.8 | 3.1 | 53.1 | .5 | 1.2 | .4 |
| 27 | 01201335 | 19.4 | 8.2 | 67.8 | 2.1 | 2.2 | .3 |
| 28 | 414640073071001 | 10.8 | 15.2 | 71.0 | 0 | 2.9 | .1 |
| Long Island Sound Coastal River Basins | | | | | | | |
| 29 | 413345072531001 | 10.1 | 46.1 | 41.2 | 0 | 1.5 | 1.2 |
| 30 | 01196580 | 38.1 | 15.2 | 43.2 | .6 | 2.2 | .8 |
| 31 | 01208869 | .0 | 97.4 | 1.4 | 0 | 1.2 | 0 |
| 32 | 01209710 | 4.2 | 50.4 | 44.3 | 0 | 1.0 | 0 |

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TABLES 7-9

Table 7. Concentrations of organochlorine compounds in whole fish tissue collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-1994

[Concentrations are in micrograms per kilogram, wet weight, unless otherwise noted. **Map No.:** See figure 1 for location of sampling sites. No., number. Less than values (<) represent the reporting limits. Values where the reporting limits are higher than the standard reporting limits were due to interferences from co-eluting compounds in samples. p,p'-DDD values shown as -99999 indicates the concentration was not determined due to co-eluting interferences]

| Map No. | Station No. or site identification No. | Sample date | Lipid (percent) | PCB, total | Aldrin | alpha-BHC | beta-BHC | delta-BHC | cis-Chlor-dane | trans-Chlor-dane | DCPA | o,p'-DDD |
|---|--|-------------|-----------------|------------|--------|-----------|----------|-----------|----------------|------------------|------|----------|
| Thames River Basin | | | | | | | | | | | | |
| 1 | 01121000 | 8-03-94 | 6.0 | <50 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 2 | 420420072010001 | 8-08-94 | 5.9 | 1,000 | <5.0 | <5.0 | <5.0 | <5.0 | 9.3 | <5.0 | <5.0 | <5.0 |
| 3 | 01125100 | 8-04-94 | 8.2 | 240 | <5.0 | <5.0 | <5.0 | <5.0 | 11 | <5.0 | <5.0 | 5.3 |
| 4 | 01126850 | 7-20-93 | 6.7 | 670 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Connecticut River Basin | | | | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | 4.1 | <50 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 6 | 01135300 | 8-05-93 | 8.1 | <50 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 7 | 01153150 | 7-16-93 | 10 | 690 | <5.0 | <5.0 | <5.0 | <5.0 | 5.7 | <5.0 | <5.0 | <5.0 |
| 8 | 01163200 | 8-01-94 | 6.6 | 580 | <5.0 | <5.0 | <5.0 | <5.0 | 5.7 | <5.0 | <5.0 | <5.0 |
| 9 | 01170500 | 7-15-93 | 12 | 820 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 10 | 01171500 | 8-15-94 | 3.6 | 190 | <5.0 | <5.0 | <5.0 | <5.0 | 53 | 16 | <5.0 | 5.1 |
| 11 | 01175500 | 8-02-94 | 9.0 | 170 | <5.0 | <5.0 | <5.0 | <5.0 | 5.9 | <5.0 | <5.0 | <5.0 |
| 12 | 420910072200001 | 8-02-94 | 6.1 | 160 | <5.0 | <5.0 | <5.0 | <5.0 | 6.0 | <5.0 | <5.0 | <5.0 |
| 13 | 01183850 | 7-14-93 | 11 | 1,400 | <5.0 | <5.0 | <5.0 | <5.0 | 16 | 7.9 | <5.0 | <5.0 |
| | Replicate | | 9.8 | 1,200 | <5.0 | <5.0 | <5.0 | <5.0 | 14 | 6.1 | <5.0 | <5.0 |
| 14 | 01184490 | 10-23-92 | 4.1 | 93 | <5.0 | <5.0 | <5.0 | <5.0 | 17 | 6.3 | <5.0 | 5.1 |
| 15 | 415645073025001 | 8-17-94 | 4.9 | 150 | <5.0 | <5.0 | <5.0 | <5.0 | 6.7 | <5.0 | <5.0 | <5.0 |
| 16 | 01189000 | 11-17-92 | 5.1 | 160 | <5.0 | <5.0 | <5.0 | <5.0 | 21 | 6.7 | <5.0 | <5.0 |
| 17 | 01191000 | 8-11-94 | 4.8 | 140 | <5.0 | <5.0 | <5.0 | <5.0 | 49 | 20 | <5.0 | 9 |
| 18 | 01192500 | 10-22-92 | 2.4 | 440 | <5.0 | <5.0 | <5.0 | <5.0 | 11 | <5.0 | <5.0 | <5.0 |
| 19 | 413615072423001 | 8-10-94 | 5.8 | 1,100 | <5.0 | <5.0 | <5.0 | <5.0 | 35 | <5.0 | <5.0 | 9.8 |
| 20 | 01192883 | 8-10-94 | 9.0 | <50 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 21 | 01192990 | 7-13-93 | 8.4 | 940 | <5.0 | <5.0 | <5.0 | <5.0 | 20 | 9.2 | <5.0 | <5.0 |
| | Replicate | | 6.0 | 860 | <5.0 | <5.0 | <5.0 | <5.0 | 18 | 8.4 | <5.0 | <5.0 |
| Housatonic River Basin | | | | | | | | | | | | |
| 22 | 422640073144501 | 8-16-94 | 2.8 | 55,000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 5.1 |
| 23 | 422102073142201 | 9-13-94 | 2.5 | 72,000 | <5.0 | <5.0 | <5.0 | <5.0 | <6.0 | <5.0 | <5.0 | <8.0 |
| 24 | 01198000 | 8-16-94 | 5.7 | 620 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 25 | 01198200 | 8-17-94 | 6.3 | 50 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 26 | 01200000 | 10-20-92 | 4.5 | 170 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 27 | 01201335 | 7-21-93 | 10 | 12,000 | <5.0 | <5.0 | <5.0 | <5.0 | 9.4 | <5.0 | <5.0 | 5.7 |
| 28 | 414640073071001 | 8-17-94 | 4.8 | 93 | <5.0 | <5.0 | <5.0 | <5.0 | 21 | 12 | <5.0 | <5.0 |
| Long Island Sound Coastal River Basins | | | | | | | | | | | | |
| 29 | 413345072531001 | 8-09-94 | 5.9 | 1,400 | <5.0 | <5.0 | <5.0 | <5.0 | 21 | 8.4 | <5.0 | <5.0 |
| 30 | 01196580 | 8-09-94 | 4.7 | 200 | <5.0 | <5.0 | <5.0 | <5.0 | 23 | 8.2 | <5.0 | <5.0 |
| 31 | 01208869 | 6-29-93 | 9.1 | 200 | <5.0 | <5.0 | <5.0 | <5.0 | 150 | 40 | <5.0 | <5.0 |
| 32 | 01209710 | 10-20-92 | 4.1 | 260 | <5.0 | <5.0 | <5.0 | <5.0 | 11 | 5.3 | <5.0 | <5.0 |

Table 7. Concentrations of organochlorine compounds in whole fish collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-1994—*Continued*

| Map. No.. | Station No. or site identification No. | Sample date | <i>p,p'</i> -DDD | <i>o,p'</i> -DDE | <i>p,p'</i> -DDE | <i>o,p'</i> -DDT | <i>p,p'</i> -DDT | Dieldrin | Endrin | Hepta-chlor | Hepta-chlor epoxide | Hexa-chloro benzene |
|---|--|-------------|------------------|------------------|------------------|------------------|------------------|----------|--------|-------------|---------------------|---------------------|
| Thames River Basin | | | | | | | | | | | | |
| 1 | 01121000 | 8-03-94 | <5.0 | <5.0 | 14 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 2 | 420420072010001 | 8-08-94 | 42 | 8.4 | 130 | <5.0 | 31 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 3 | 01125100 | 8-04-94 | 38 | <5.0 | 250 | <5.0 | 11 | 14 | <5.0 | <5.0 | <5.0 | <5.0 |
| 4 | 01126850 | 7-20-93 | 12 | <5.0 | 57 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Connecticut River Basin | | | | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | <5.0 | <5.0 | 16 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 6 | 01135300 | 8-05-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 7 | 01153150 | 7-16-93 | 14 | <5.0 | 52 | <5.0 | 14 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 8 | 01163200 | 8-01-94 | 15 | <5.0 | 48 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 9 | 01170500 | 7-15-93 | 12 | <5.0 | 110 | <5.0 | 20 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 10 | 01171500 | 8-15-94 | 39 | <5.0 | 100 | <5.0 | 24 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 11 | 01175500 | 8-02-94 | 5.7 | <5.0 | 87 | 18 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 12 | 420910072200001 | 8-02-94 | 9.4 | <5.0 | 53 | <5.0 | 7.3 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 13 | 01183850 | 7-14-93 | 18 | <5.0 | 210 | <5.0 | 30 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| | Replicate | | 17 | <5.0 | 240 | <5.0 | 33 | 5.4 | <5.0 | <5.0 | <5.0 | <5.0 |
| 14 | 01184490 | 10-23-92 | -99999 | <5.0 | 140 | <5.0 | 33 | 8.5 | <5.0 | <5.0 | <5.0 | <5.0 |
| 15 | 415645073025001 | 8-17-94 | 10 | <5.0 | 24 | <5.0 | 5.8 | 5.6 | <5.0 | <5.0 | <5.0 | <5.0 |
| 16 | 01189000 | 11-17-92 | 7.6 | <5.0 | 15 | <5.0 | 10 | 11 | <5.0 | <5.0 | <5.0 | <5.0 |
| 17 | 01191000 | 8-11-94 | 46 | <5.0 | 110 | <5.0 | 21 | 8.3 | <5.0 | <5.0 | <5.0 | <5.0 |
| 18 | 01192500 | 10-22-92 | -99999 | <5.0 | 51 | <5.0 | 7.4 | 5.6 | <5.0 | <5.0 | <5.0 | <5.0 |
| 19 | 413615072423001 | 8-10-94 | 41 | 6.9 | 50 | <5.0 | 11 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 20 | 01192883 | 8-10-94 | 13 | <5.0 | 66 | <5.0 | 8.6 | 14 | <5.0 | <5.0 | <5.0 | <5.0 |
| 21 | 01192990 | 7-13-93 | 26 | <5.0 | 110 | <5.0 | 26 | 6.7 | <5.0 | <5.0 | <5.0 | <5.0 |
| | Replicate | | 23 | <5.0 | 120 | <5.0 | 27 | 5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Housatonic River Basin | | | | | | | | | | | | |
| 22 | 422640073144501 | 8-16-94 | 24 | <250 | 38 | <5.0 | 11 | <5.0 | <5.0 | <5.0 | <5.0 | 15 |
| 23 | 422102073142201 | 9-13-94 | 100 | <8.0 | 160 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 24 | 01198000 | 8-16-94 | <5.0 | <5.0 | 23 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 25 | 01198200 | 8-17-94 | <5.0 | <5.0 | 17 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 26 | 01200000 | 10-20-92 | <5.0 | <5.0 | 16 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 27 | 01201335 | 7-21-93 | 27 | <5.0 | 140 | <5.0 | 14 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 28 | 414640073071001 | 8-17-94 | 15 | 6.0 | 8.1 | <5.0 | <5.0 | 10 | <5.0 | <5.0 | <5.0 | <5.0 |
| Long Island Sound Coastal River Basins | | | | | | | | | | | | |
| 29 | 413345072531001 | 8-09-94 | 20 | 7.5 | 22 | <5.0 | 6.4 | 16 | <5.0 | <5.0 | <5.0 | <5.0 |
| 30 | 01196580 | 8-09-94 | 22 | <5.0 | 190 | 5.2 | 27 | 40 | <5.0 | <5.0 | <5.0 | 9.1 |
| 31 | 01208869 | 6-29-93 | 31 | <5.0 | 42 | <5.0 | 25 | 140 | <5.0 | <5.0 | 24 | <5.0 |
| 32 | 01209710 | 10-20-92 | -99999 | <5.0 | 23 | <5.0 | 5.6 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |

Table 7. Concentrations of organochlorine compounds in whole fish collected from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-1994—*Continued*

| Map. No.. | Station No. or site identification No. | Sample date | Lindane | <i>o,p'</i> -Methoxychlor | <i>p,p'</i> -Methoxychlor | Mirex | <i>cis</i> -Nonachlor | <i>trans</i> -Nonachlor | Oxychlor-dane | Penta-chloro-anisole | Toxa-phene |
|---|--|-------------|---------|---------------------------|---------------------------|-------|-----------------------|-------------------------|---------------|----------------------|------------|
| Thames River Basin | | | | | | | | | | | |
| 1 | 01121000 | 8-03-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 2 | 420420072010001 | 8-08-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 18 | <5.0 | 6.7 | <200 |
| 3 | 01125100 | 8-04-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 13 | <5.0 | 19 | <200 |
| 4 | 01126850 | 7-20-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 5.0 | <5.0 | <5.0 | <200 |
| Connecticut River Basin | | | | | | | | | | | |
| 5 | 01131400 | 7-22-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 6 | 01135300 | 8-05-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 7 | 01153150 | 7-16-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 8.3 | <5.0 | <5.0 | <200 |
| 8 | 01163200 | 8-01-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 7.3 | <5.0 | 24 | <200 |
| 9 | 01170500 | 7-15-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 14 | <5.0 | <5.0 | <200 |
| 10 | 01171500 | 8-15-94 | <5.0 | <5.0 | <5.0 | <5.0 | 15 | 40 | 7.0 | <5.0 | <200 |
| 11 | 01175500 | 8-02-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 6.4 | <5.0 | <5.0 | <200 |
| 12 | 420910072200001 | 8-02-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 9.1 | <5.0 | <5.0 | <200 |
| 13 | 01183850 | 7-14-93 | <5.0 | <5.0 | <5.0 | <5.0 | 6.4 | 27 | 5.3 | <5.0 | <200 |
| | Replicate | | <5.0 | <5.0 | <5.0 | <5.0 | 5.6 | 24 | 5.9 | <5.0 | <200 |
| 14 | 01184490 | 10-23-92 | <5.0 | <5.0 | <5.0 | <5.0 | 12 | 20 | 12 | <5.0 | <200 |
| 15 | 415645073025001 | 8-17-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 9.8 | <5.0 | 6.9 | <200 |
| 16 | 01189000 | 11-17-92 | <5.0 | <5.0 | <5.0 | <5.0 | 9.0 | 18 | 10 | 14 | <200 |
| 17 | 01191000 | 8-11-94 | <5.0 | <5.0 | <5.0 | <5.0 | 11 | 35 | 12 | <5.0 | <200 |
| 18 | 01192500 | 10-22-92 | <5.0 | <5.0 | <5.0 | <5.0 | 8.9 | 18 | 8.3 | <5.0 | <200 |
| 19 | 413615072423001 | 8-10-94 | <5.0 | <5.0 | <5.0 | <5.0 | 9.2 | 26 | 5.7 | <5.0 | <200 |
| 20 | 01192883 | 8-10-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 9.1 | <5.0 | <5.0 | <200 |
| 21 | 01192990 | 7-13-93 | <5.0 | <5.0 | <5.0 | <5.0 | 8.6 | 26 | <5.0 | <5.0 | <200 |
| | Replicate | | <5.0 | <5.0 | <5.0 | <5.0 | 8.3 | 24 | <5.0 | <5.0 | <200 |
| Housatonic River Basin | | | | | | | | | | | |
| 22 | 422640073144501 | 8-16-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 14 | 7.4 | 8.9 | <200 |
| 23 | 422102073142201 | 9-13-94 | <5.0 | <40 | <5.0 | <5.0 | <5.0 | <7.0 | <5.0 | <5.0 | <200 |
| 24 | 01198000 | 8-16-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 25 | 01198200 | 8-17-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 26 | 01200000 | 10-20-92 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <200 |
| 27 | 01201335 | 7-21-93 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 17 | <5.0 | <5.0 | <200 |
| 28 | 414640073071001 | 8-17-94 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 29 | 5.2 | 24 | <200 |
| Long Island Sound Coastal River Basins | | | | | | | | | | | |
| 29 | 413345072531001 | 8-09-94 | <5.0 | <5.0 | <5.0 | <5.0 | 6.0 | 17 | 6.4 | <5.0 | <200 |
| 30 | 01196580 | 8-09-94 | <5.0 | <5.0 | <5.0 | <5.0 | 9.7 | 28 | 12 | <5.0 | <200 |
| 31 | 01208869 | 6-29-93 | <5.0 | <5.0 | <5.0 | <5.0 | 37 | 120 | 22 | <5.0 | <200 |
| 32 | 01209710 | 10-20-92 | <5.0 | <5.0 | <5.0 | <5.0 | 5.7 | 11 | <5.0 | <5.0 | <200 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[Fish collected were white suckers (*Catostomus commersoni*), except at Station Number 01135300, Sleepers River near St. Johnsbury, VT (Ref. No. 6), where longnose suckers (*Catostomus catostomus*) were collected. **Map No.:** See figure 1 for location of sampling site. **Gender:** M, male; F, female; ?, gender uncertain. No., number; mm, millimeter; g, gram, yr, year]

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|--------------------------------|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| Thames River Basin | | | | | | | | |
| 1 | 01121000 | 1 | 8-03-94 | 210 | 260 | 195 | M | 12 |
| | | 2 | | 250 | 300 | 280 | F | 14 |
| | | 3 | | 285 | 345 | 347 | M | 17 |
| | | 4 | | 290 | 355 | 485 | F | 16 |
| | | 5 | | 270 | 340 | 408 | F | 14 |
| | | 6 | | 300 | 365 | 575 | F | 13 |
| | | 7 | | 245 | 300 | 296 | M | 12 |
| | | 8 | | 220 | 265 | 212 | F | 11 |
| 2 | 420420072010001 | 1 | 8-08-94 | 270 | 325 | 368 | M | 12 |
| | | 2 | | 290 | 345 | 439 | M | 16 |
| | | 3 | | 300 | 360 | 466 | M | 16 |
| | | 4 | | 320 | 395 | 664 | F | 18 |
| | | 5 | | 300 | 370 | 471 | F | 17 |
| 3 | 01125100 | 1 | 8-04-94 | 340 | 420 | 785 | M | 19 |
| | | 2 | | 365 | 440 | 906 | F | 19 |
| | | 3 | | 370 | 450 | 993 | M | 20 |
| | | 4 | | 370 | 450 | 817 | F | 21 |
| | | 5 | | 400 | 480 | 1,207 | F | 20 |
| | | 6 | | 360 | 435 | 750 | F | 17 |
| 4 | 01126850 | 1 | 7-20-93 | 330 | 400 | 669 | M | 18 |
| | | 2 | | 310 | 380 | 627 | M | 16 |
| | | 3 | | 365 | 440 | 859 | F | 19 |
| | | 4 | | 335 | 415 | 666 | M | 21 |
| | | 5 | | 365 | 445 | 835 | F | 19 |
| | | 6 | | 380 | 465 | 921 | F | 22 |
| | | 7 | | 350 | 430 | 790 | F | 19 |
| | | 8 | | 325 | 410 | 630 | M | 21 |
| Connecticut River Basin | | | | | | | | |
| 5 | 01131400 | 1 | 7-22-93 | 280 | 340 | 373 | F | 16 |
| | | 2 | | 265 | 325 | 331 | M | 14 |
| | | 3 | | 265 | 330 | 342 | M | 15 |
| | | 4 | | 255 | 315 | 303 | M | 14 |
| | | 5 | | 280 | 345 | 393 | F | 15 |
| | | 6 | | 280 | 340 | 398 | F | 16 |
| | | 7 | | 275 | 340 | 379 | F | 16 |
| | | 8 | | 280 | 345 | 417 | F | 17 |
| 6 | 01135300 | 1 | 8-05-93 | 145 | 180 | 59 | F | 7 |
| | | 2 | | 160 | 195 | 72 | F | 9 |
| | | 3 | | 145 | 180 | 67 | F | 9 |
| | | 4 | | 160 | 195 | 79 | F | 11 |
| | | 5 | | 150 | 180 | 63 | F | 8 |
| | | 6 | | 145 | 180 | 59 | F | 10 |
| | | 7 | | 145 | 180 | 62 | F | 9 |
| | | 8 | | 155 | 185 | 70 | F | 11 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|--|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| <i>Connecticut River Basin—Continued</i> | | | | | | | | |
| 7 | 01153150 | 1 | 7-16-93 | 440 | 535 | 1,760 | F | 24 |
| | | 2 | | 440 | 535 | 1,694 | F | 25 |
| | | 3 | | 405 | 490 | 1,252 | F | 21 |
| | | 4 | | 415 | 505 | 1,372 | F | 23 |
| | | 5 | | 385 | 470 | 1,207 | M | 22 |
| | | 6 | | 405 | 500 | 1,340 | F | 23 |
| | | 7 | | 385 | 470 | 1,195 | M | 19 |
| | | 8 | | 390 | 470 | 1,226 | M | 19 |
| 8 | 01163200 | 1 | 8-01-94 | 270 | 330 | 346 | M | 16 |
| | | 2 | | 295 | 355 | 568 | M | 18 |
| | | 3 | | 285 | 345 | 459 | F | 15 |
| | | 4 | | 295 | 355 | 541 | F | 17 |
| | | 5 | | 325 | 390 | 622 | F | 19 |
| 9 | 01170500 | 1 | 7-15-93 | 380 | 450 | 980 | M | 19 |
| | | 2 | | 340 | 410 | 868 | M | 18 |
| | | 3 | | 370 | 445 | 943 | F | 19 |
| | | 4 | | 355 | 430 | 817 | M | 19 |
| | | 5 | | 365 | 450 | 1,027 | F | 20 |
| | | 6 | | 390 | 470 | 1,190 | F | 21 |
| | | 7 | | 385 | 455 | 1,237 | F | 21 |
| | | 8 | | 390 | 475 | 1,060 | F | 23 |
| 10 | 01171500 | 1 | 8-15-94 | 330 | 400 | 603 | F | 20 |
| | | 2 | | 320 | 390 | 508 | F | 19 |
| | | 3 | | 290 | 355 | 459 | M | 18 |
| | | 4 | | 295 | 365 | 394 | F | 17 |
| | | 5 | | 315 | 385 | 526 | M | 16 |
| | | 6 | | 260 | 320 | 345 | M | 13 |
| | | 7 | | 280 | 350 | 403 | F | 14 |
| | | 8 | | 290 | 360 | 405 | M | 18 |
| 11 | 01175500 | 1 | 8-02-94 | 310 | 375 | 615 | F | 15 |
| | | 2 | | 360 | 435 | 998 | M | 20 |
| | | 3 | | 390 | 470 | 1,318 | F | 22 |
| | | 4 | | 310 | 380 | 747 | M | 18 |
| | | 5 | | 410 | 495 | 1,577 | F | 22 |
| | | 6 | | 365 | 450 | 1,112 | M | 21 |
| | | 7 | | 340 | 405 | 745 | M | 17 |
| | | 8 | | 300 | 365 | 508 | M | 15 |
| 12 | 420910072200001 | 1 | 8-02-94 | 370 | 450 | 957 | F | 22 |
| | | 2 | | 325 | 375 | 582 | M | 18 |
| | | 3 | | 285 | 350 | 415 | M | 15 |
| | | 4 | | 305 | 375 | 542 | M | 18 |
| | | 5 | | 345 | 420 | 695 | F | 20 |
| 13 | 01183850 | 1 | 7-14-93 | 365 | 440 | 978 | F | 18 |
| | | 2 | | 340 | 405 | 722 | M | 16 |
| | | 3 | | 385 | 460 | 998 | F | 19 |
| | | 4 | | 330 | 395 | 813 | M | 16 |
| | | 5 | | 335 | 405 | 785 | M | 17 |
| | | 6 | | 370 | 460 | 991 | F | 21 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|--|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| Connecticut River Basin—Continued | | | | | | | | |
| 13 | 01183850 | 7 | 7-14-93 | 365 | 450 | 1,000 | F | 17 |
| | | 8 | | 370 | 450 | 921 | ? | 17 |
| | Replicate | 1 | | 350 | 430 | 868 | M | 19 |
| | | 2 | | 385 | 460 | 1,222 | M | 21 |
| | | 3 | | 380 | 460 | 1,278 | F | 22 |
| | | 4 | | 395 | 475 | 1,124 | F | 21 |
| | | 5 | | 375 | 465 | 1,127 | F | 21 |
| | | 6 | | 305 | 375 | 608 | M | 16 |
| 14 | 01184490 | 7 | 10-23-92 | 305 | 370 | 571 | F | 15 |
| | | 8 | | 300 | 360 | 520 | M | 13 |
| | | 1 | | 242 | 297 | 249 | M | 9 |
| | | 2 | | 216 | 274 | 209 | F | 10 |
| | | 3 | | 211 | 262 | 181 | ? | 10 |
| | | 4 | | 194 | 240 | 154 | ? | 7 |
| | | 5 | | 174 | 223 | 124 | ? | 6 |
| | | 6 | | 193 | 240 | 140 | F | 7 |
| 15 | 415645073025001 | 7 | 8-17-94 | 170 | 211 | 103 | M | 6 |
| | | 8 | | 165 | 210 | 97 | F | 7 |
| | | 1 | | 225 | 280 | 221 | F | 11 |
| | | 2 | | 260 | 320 | 353 | F | 13 |
| | | 3 | | 230 | 280 | 234 | M | 12 |
| | | 4 | | 245 | 300 | 297 | F | 14 |
| | | 5 | | 225 | 275 | 216 | F | 10 |
| | | 6 | | 235 | 285 | 249 | F | 12 |
| 16 | 01189000 | 7 | 11-17-92 | 220 | 270 | 260 | F | 12 |
| | | 8 | | 230 | 285 | 223 | F | 13 |
| | | 1 | | 341 | 412 | 787 | F | 16 |
| | | 2 | | 294 | 362 | 524 | F | 12 |
| | | 3 | | 330 | 410 | 677 | F | 18 |
| | | 4 | | 325 | 387 | 638 | F | 13 |
| | | 5 | | 305 | 375 | 550 | F | 14 |
| | | 6 | | 295 | 355 | 518 | F | 13 |
| 17 | 01191000 | 7 | 8-11-94 | 273 | 327 | 375 | F | 11 |
| | | 8 | | 285 | 348 | 438 | M | 13 |
| | | 1 | | 340 | 420 | 668 | F | 18 |
| | | 2 | | 270 | 330 | 384 | F | 14 |
| | | 3 | | 230 | 290 | 246 | F | 11 |
| | | 4 | | 230 | 285 | 253 | F | 14 |
| | | 5 | | 235 | 290 | 253 | M | 12 |
| | | 6 | | 220 | 275 | 214 | M | 13 |
| 18 | 01192500 | 7 | 10-22-92 | 225 | 280 | 247 | F | 13 |
| | | 8 | | 230 | 285 | 202 | F | 13 |
| | | 1 | | 264 | 325 | 339 | F | 12 |
| | | 2 | | 250 | 315 | 289 | F | 14 |
| | | 3 | | 225 | 284 | 232 | M | 12 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|--|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| Connecticut River Basin—Continued | | | | | | | | |
| 18 | 01192500 | 6 | 10-22-94 | 215 | 268 | 195 | F | 10 |
| | | 7 | | 235 | 297 | 269 | F | 11 |
| | | 8 | | 218 | 271 | 200 | F | 10 |
| 19 | 413615072423001 | 1 | 8-10-94 | 340 | 410 | 690 | F | 17 |
| | | 2 | | 350 | 420 | 810 | F | 20 |
| | | 3 | | 330 | 400 | 650 | F | 16 |
| | | 4 | | 335 | 410 | 722 | F | 19 |
| | | 5 | | 335 | 410 | 694 | F | 18 |
| | | 6 | | 325 | 395 | 654 | F | 16 |
| | | 7 | | 335 | 410 | 698 | F | 17 |
| | | 8 | | 345 | 420 | 730 | F | 18 |
| 20 | 01192883 | 1 | 8-10-94 | 335 | 400 | 667 | F | 15 |
| | | 2 | | 330 | 400 | 711 | F | 16 |
| | | 3 | | 310 | 380 | 574 | F | 14 |
| | | 4 | | 310 | 375 | 612 | F | 14 |
| | | 5 | | 330 | 400 | 733 | F | 16 |
| | | 6 | | 300 | 370 | 606 | F | 14 |
| | | 7 | | 295 | 355 | 527 | F | 13 |
| | | 8 | | 280 | 340 | 461 | M | 16 |
| 21 | 01192990 | 1 | 7-13-93 | 345 | 420 | 839 | F | 17 |
| | | 2 | | 360 | 450 | 940 | M | 18 |
| | | 3 | | 380 | 455 | 984 | M | 18 |
| | | 4 | | 355 | 435 | 825 | M | 16 |
| | | 5 | | 345 | 425 | 740 | M | 18 |
| | | 6 | | 350 | 425 | 753 | M | 15 |
| | | 7 | | 365 | 450 | 900 | M | 17 |
| | | 8 | | 310 | 390 | 590 | M | 13 |
| 21 | Replicate | 1 | | 355 | 430 | 887 | F | 18 |
| | | 2 | | 330 | 400 | 690 | M | 17 |
| | | 3 | | 370 | 450 | 963 | F | 20 |
| | | 4 | | 320 | 385 | 630 | M | 16 |
| | | 5 | | 310 | 380 | 598 | F | 16 |
| | | 6 | | 365 | 440 | 893 | F | 18 |
| | | 7 | | 365 | 435 | 933 | F | 17 |
| | | 8 | | 370 | 445 | 1,002 | F | 18 |
| Housatonic River Basin | | | | | | | | |
| 22 | 422640073144501 | 1 | 8-16-94 | 260 | 310 | 330 | F | 16 |
| | | 2 | | 270 | 335 | 359 | F | 15 |
| | | 3 | | 250 | 310 | 295 | F | 12 |
| | | 4 | | 255 | 315 | 305 | F | 13 |
| | | 5 | | 250 | 300 | 273 | F | 15 |
| | | 6 | | 250 | 305 | 262 | F | 11 |
| | | 7 | | 235 | 290 | 266 | F | 12 |
| | | 8 | | 240 | 295 | 262 | F | 13 |
| 23 | 422102073142201 | 1 | 9-13-94 | 300 | 370 | 495 | F | 21 |
| | | 2 | | 315 | 380 | 510 | F | 19 |
| | | 3 | | 310 | 370 | 440 | F | 19 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|---|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| Housatonic River Basin—Continued | | | | | | | | |
| 23 | 422102073142201 | 4 | 9-13-94 | 290 | 360 | 492 | F | 17 |
| | | 5 | | 305 | 370 | 493 | F | 20 |
| | | 6 | | 285 | 350 | 480 | F | 19 |
| | | 7 | | 275 | 335 | 386 | M | 17 |
| | | 8 | | 330 | 400 | 580 | F | 21 |
| 24 | 01198000 | 1 | 8-16-94 | 365 | 440 | 1,003 | F | 18 |
| | | 2 | | 325 | 395 | 553 | F | 16 |
| | | 3 | | 300 | 360 | 523 | F | 13 |
| | | 4 | | 300 | 370 | 533 | F | 16 |
| | | 5 | | 335 | 410 | 821 | F | 18 |
| | | 6 | | 285 | 355 | 448 | F | 15 |
| | | 7 | | 295 | 365 | 519 | M | 17 |
| | | 8 | | 280 | 345 | 463 | F | 14 |
| 25 | 01198200 | 1 | 8-17-94 | 280 | 345 | 404 | F | 12 |
| | | 2 | | 250 | 310 | 287 | F | 12 |
| | | 3 | | 260 | 320 | 352 | M | 13 |
| | | 4 | | 255 | 310 | 317 | M | 14 |
| | | 5 | | 305 | 370 | 561 | F | 16 |
| | | 6 | | 250 | 305 | 282 | M | 12 |
| | | 7 | | 250 | 305 | 302 | M | 12 |
| | | 8 | | 235 | 290 | 252 | M | 11 |
| 26 | 01200000 | 1 | 10-20-92 | 339 | 404 | 694 | F | 13 |
| | | 2 | | 317 | 376 | 585 | F | 14 |
| | | 3 | | 235 | 291 | 278 | M | 9 |
| | | 4 | | 252 | 310 | 304 | F | 11 |
| | | 5 | | 250 | 304 | 338 | M | 12 |
| | | 6 | | 295 | 363 | 541 | M | 14 |
| | | 7 | | 222 | 275 | 239 | ? | 9 |
| | | 8 | | 200 | 247 | 189 | M | 7 |
| 27 | 01201335 | 1 | 7-21-93 | 300 | 360 | 618 | M | 16 |
| | | 2 | | 330 | 405 | 850 | M | 18 |
| | | 3 | | 390 | 470 | 1,240 | F | 20 |
| | | 4 | | 350 | 430 | 849 | M | 18 |
| | | 5 | | 390 | 475 | 1,300 | F | 19 |
| | | 6 | | 320 | 385 | 729 | M | 17 |
| | | 7 | | 300 | 365 | 646 | F | 13 |
| | | 8 | | 265 | 325 | 404 | M | 12 |
| 28 | 414640073071001 | 1 | 8-17-94 | 215 | 260 | 198 | M | 9 |
| | | 2 | | 190 | 235 | 134 | M | 7 |
| | | 3 | | 185 | 225 | 137 | M | 8 |
| | | 4 | | 170 | 210 | 109 | M | 7 |
| | | 5 | | 185 | 230 | 123 | M | 8 |
| | | 6 | | 180 | 220 | 109 | M | 8 |
| | | 7 | | 170 | 210 | 106 | F | 6 |
| | | 8 | | 170 | 210 | 107 | M | 7 |

Table 8. Size, gender, and age of individual fish composited for organochlorine analysis at each sampling site, Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Fish sample No. | Sample date | Standard length (mm) | Total length (mm) | Weight (g) | Gender | Age (yr) |
|---|---|-----------------|-------------|----------------------|-------------------|------------|--------|----------|
| Long Island Sound Coastal River Basins | | | | | | | | |
| 29 | 413345072531001 | 1 | 8-09-94 | 340 | 410 | 695 | F | 18 |
| | | 2 | | 365 | 440 | 898 | F | 19 |
| | | 3 | | 310 | 380 | 583 | M | 16 |
| | | 4 | | 335 | 405 | 675 | F | 18 |
| | | 5 | | 340 | 405 | 738 | F | 18 |
| 30 | 01196580 | 1 | 8-09-94 | 370 | 440 | 806 | F | 19 |
| | | 2 | | 325 | 395 | 710 | F | 17 |
| | | 3 | | 330 | 405 | 684 | F | 16 |
| | | 4 | | 335 | 415 | 700 | F | 17 |
| | | 5 | | 340 | 415 | 727 | F | 18 |
| | | 6 | | 325 | 400 | 670 | F | 18 |
| | | 7 | | 330 | 420 | 680 | F | 20 |
| | | 8 | | 330 | 410 | 717 | F | 18 |
| 31 | 01208869 | 1 | 6-29-93 | 240 | 282 | 265 | M | 9 |
| | | 2 | | 250 | 295 | 320 | F | 12 |
| | | 3 | | 258 | 304 | 392 | ? | 13 |
| | | 4 | | 280 | 325 | 427 | F | 14 |
| | | 5 | | 240 | 287 | 290 | F | 12 |
| | | 6 | | 217 | 265 | 241 | F | 11 |
| | | 7 | | 216 | 260 | 214 | F | 12 |
| | | 8 | | 228 | 278 | 232 | ? | 13 |
| 32 | 01209710 | 1 | 10-20-92 | 233 | 295 | 269 | M | 9 |
| | | 2 | | 240 | 298 | 278 | M | 10 |
| | | 3 | | 251 | 311 | 353 | M | 9 |
| | | 4 | | 222 | 278 | 226 | F | 8 |
| | | 5 | | 230 | 280 | 230 | M | 9 |
| | | 6 | | 219 | 270 | 233 | M | 9 |
| | | 7 | | 230 | 271 | 195 | M | 7 |
| | | 8 | | 222 | 275 | 227 | M | 10 |

Table 9. Drainage-basin characteristics and land-use categories of sampling sites where fish were collected for contaminant analyses from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94

[No., number. Population based on 1990 U.S. Census data. mi², square mile]

| Map. No. | Station No. and site identification No. | Drainage-basin characteristics | | Land-use categories, in percentage of basin area | | | | | |
|---|---|--------------------------------|---------------------|--|-------------------------|------------|------------------------------|-----------------------|----------------------|
| | | Basin area (mi ²) | Population in basin | Residential | Commercial and services | Industrial | Transportation and utilities | Mixed and other urban | Cropland and pasture |
| Thames River Basin | | | | | | | | | |
| 1 | 01121000 | 27.1 | 3,096 | 1.7 | 0.5 | 0.0 | 0.2 | 0.2 | 11.5 |
| 2 | 420420072010001 | 122 | 34,468 | 7.3 | .9 | .5 | 2.2 | .5 | 6.9 |
| 3 | 01125100 | 101 | 49,732 | 13.0 | 1.7 | .1 | .8 | 1.8 | 5.0 |
| 4 | 01126850 | 644 | 160,936 | 5.6 | .7 | .2 | 1.0 | 1.1 | 11.5 |
| Connecticut River Basin | | | | | | | | | |
| 5 | 01131400 | 1,515 | 21,908 | 0.3 | 0.1 | 0.0 | 0.0 | 0.0 | 5.5 |
| 6 | 01135300 | 42.9 | 1,168 | .2 | .0 | .0 | .0 | .0 | 27.8 |
| 7 | 01153150 | 5,298 | 209,434 | .7 | .1 | .0 | .6 | .3 | 11.4 |
| 8 | 01163200 | 34.2 | 18,967 | 14.1 | 3.0 | .8 | 2.3 | 1.5 | 3.1 |
| 9 | 01170500 | 7,873 | 421,273 | 1.4 | .2 | .1 | .5 | .4 | 10.3 |
| 10 | 01171500 | 54.0 | 11,502 | 9.5 | 1.7 | .1 | .0 | .7 | 8.7 |
| 11 | 01175500 | 189 | 4,367 | .7 | .1 | .0 | .0 | .1 | 2.6 |
| 12 | 420910072200001 | 207 | 40,162 | 6.7 | .9 | .5 | .1 | .5 | 16.5 |
| 13 | 01183850 | 9,650 | 1,072,943 | 3.1 | .5 | .2 | .6 | .5 | 10.5 |
| 14 | 01184490 | 14.7 | 6,618 | 5.8 | .2 | .0 | .4 | 1.7 | 54.6 |
| 15 | 415645073025001 | 44.9 | 11,404 | 6.7 | 1.4 | .2 | 1.4 | .3 | 6.1 |
| 16 | 01189000 | 44.9 | 54,161 | 35.0 | 3.8 | .6 | .0 | 3.1 | 6.6 |
| 17 | 01191000 | 26.6 | 32,371 | 32.9 | 8.2 | 1.4 | .0 | 5.7 | 22.4 |
| 18 | 01192500 | 73.6 | 97,365 | 41.3 | 3.6 | 1.1 | 2.4 | 2.9 | 11.0 |
| 19 | 413615072423001 | 56.9 | 66,798 | 27.6 | 3.6 | .4 | 1.3 | 4.7 | 23.7 |
| 20 | 01192883 | 30.1 | 8,020 | 4.6 | .5 | .1 | .0 | 1.9 | 35.8 |
| 21 | 01192990 | 10,894 | 2,023,710 | 5.0 | .8 | .2 | .6 | .7 | 11.1 |
| Housatonic River Basin | | | | | | | | | |
| 22 | 422640073144501 | 70.3 | 26,388 | 12.9 | 1.8 | 1.5 | 0.4 | 1.8 | 7.5 |
| 23 | 422102073142201 | 168 | 62,674 | 13.9 | 2.1 | 0.6 | .7 | 1.8 | 10.2 |
| 24 | 01198000 | 51.0 | 2,704 | 3.2 | .5 | 0.0 | .6 | .0 | 20.9 |
| 25 | 01198200 | 60.6 | 2,988 | 2.9 | .2 | 0.0 | .0 | .0 | 12.8 |
| 26 | 01200000 | 200 | 19,348 | 2.0 | .5 | 0.1 | .0 | .5 | 41.8 |
| 27 | 01201335 | 1,120 | 164,578 | 6.2 | .7 | 0.2 | .4 | .8 | 19.3 |
| 28 | 414640073071001 | 54.9 | 28,796 | 11.5 | 2.1 | 0.2 | .8 | .7 | 10.8 |
| Long Island Sound Coastal River Basins | | | | | | | | | |
| 29 | 413345072531001 | 57.3 | 65,840 | 35.6 | 5.4 | 0.8 | 2.1 | 2.2 | 9.8 |
| 30 | 01196580 | 16.6 | 8,929 | 12.8 | .0 | .1 | 1.7 | .6 | 36.4 |
| 31 | 01208869 | 8.1 | 25,325 | 79.5 | 6.0 | .0 | .0 | 11.8 | .0 |
| 32 | 01209710 | 32.9 | 21,734 | 44.4 | 2.4 | .4 | .0 | 3.3 | 4.3 |

Table 9. Drainage-basin characteristics and land-use categories of sampling sites where fish were collected for contaminant analyses from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Land-use categories, in percentage of basin area | | | | | | | | |
|---|---|--|-----------------------|-------------------|-----------------------|------------------|-------------------|--------------|--------------------|-------|
| | | Orchards | Confined feeding lots | Other agriculture | Shrub and brush range | Deciduous forest | Ever-green forest | Mixed forest | Streams and canals | Lakes |
| Thames River Basin | | | | | | | | | | |
| 1 | 01121000 | 0.0 | 0.0 | 0.0 | 0.0 | 64.8 | 7.0 | 11.7 | 0.0 | 1.0 |
| 2 | 420420072010001 | .5 | .0 | .0 | .0 | 63.2 | 5.3 | 2.4 | .0 | 1.8 |
| 3 | 01125100 | .2 | .0 | .0 | .3 | 45.8 | 4.3 | 18.5 | .0 | 4.5 |
| 4 | 01126850 | .2 | .0 | .0 | .1 | 53.6 | 4.2 | 15.9 | .1 | 1.4 |
| Connecticut River Basin | | | | | | | | | | |
| 5 | 01131400 | 0.0 | 0.0 | 0.0 | 0.0 | 26.2 | 40.0 | 15.9 | 0.0 | 0.8 |
| 6 | 01135300 | .0 | .0 | .0 | .0 | 31.9 | 26.1 | 14.0 | .0 | 0.0 |
| 7 | 01153150 | .0 | .0 | .0 | .0 | 25.2 | 23.4 | 33.4 | .2 | 0.8 |
| 8 | 01163200 | .0 | .0 | .1 | .0 | 31.7 | 7.0 | 26.8 | .0 | 1.5 |
| 9 | 01170500 | .0 | .0 | .0 | .0 | 27.2 | 23.3 | 32.2 | .3 | 0.8 |
| 10 | 01171500 | .3 | .0 | .0 | .0 | 54.0 | 5.2 | 17.8 | .0 | 0.6 |
| 11 | 01175500 | .1 | .0 | .0 | .0 | 64.7 | 7.2 | 1.0 | .0 | 0.2 |
| 12 | 420910072200001 | .3 | .0 | .0 | .0 | 54.9 | 10.2 | 1.5 | .0 | 1.4 |
| 13 | 01183850 | .1 | .0 | .0 | .0 | 30.9 | 21.9 | 26.8 | .3 | 0.8 |
| 14 | 01184490 | .0 | .3 | .0 | .0 | 28.2 | .0 | 4.1 | .0 | 0.5 |
| 15 | 415645073025001 | .0 | .0 | .0 | 1.5 | 77.1 | .0 | .5 | .0 | 2.9 |
| 16 | 01189000 | .0 | .0 | .0 | .0 | 43.4 | 3.0 | 1.9 | .0 | 0.2 |
| 17 | 01191000 | .0 | .0 | .1 | .5 | 24.4 | .2 | .4 | .0 | 0.2 |
| 18 | 01192500 | .0 | .0 | .0 | .2 | 28.2 | .0 | 6.8 | .0 | 1.5 |
| 19 | 413615072423001 | .7 | .0 | .0 | .0 | 35.1 | .5 | .0 | .0 | 1.0 |
| 20 | 01192883 | 1.6 | .3 | .0 | .0 | 53.1 | 1.0 | .0 | .0 | 0.7 |
| 21 | 01192990 | .1 | .0 | .0 | .0 | 31.6 | 20.2 | 24.5 | .4 | 0.8 |
| Housatonic River Basin | | | | | | | | | | |
| 22 | 422640073144501 | 0.0 | 0.1 | 0.0 | 0.0 | 35.3 | 29.5 | 1.3 | 0.0 | 1.2 |
| 23 | 422102073142201 | .1 | .1 | .0 | .0 | 42.2 | 21.0 | 1.2 | .0 | .9 |
| 24 | 01198000 | .0 | .0 | .0 | .0 | 52.2 | 20.5 | .0 | .0 | .4 |
| 25 | 01198200 | .0 | .0 | .1 | .0 | 46.5 | 34.1 | .0 | .0 | 1.4 |
| 26 | 01200000 | .0 | .0 | .0 | .0 | 49.8 | 1.3 | 2.1 | .0 | 1.0 |
| 27 | 01201335 | .0 | .0 | .0 | .2 | 53.1 | 13.4 | 1.1 | .0 | 1.1 |
| 28 | 414640073071001 | .0 | .0 | .0 | .9 | 67.8 | .0 | 2.4 | .0 | 1.2 |
| Long Island Sound Coastal River Basins | | | | | | | | | | |
| 29 | 413345072531001 | 0.3 | 0.0 | 0.0 | 0.0 | 40.6 | 0.0 | 0.6 | 0.0 | 0.3 |
| 30 | 01196580 | 1.7 | .0 | .0 | .0 | 42.1 | 1.1 | .0 | .0 | 2.2 |
| 31 | 01208869 | .0 | .0 | .0 | .0 | 1.4 | .0 | .0 | .0 | .0 |
| 32 | 01209710 | .0 | .0 | .0 | .0 | 44.3 | .0 | .0 | .0 | .8 |

Table 9. Drainage-basin characteristics and land-use categories of sampling sites where fish were collected for contaminant analyses from the Connecticut, Housatonic, and Thames River Basins Study Unit, 1992-94—*Continued*

| Map No. | Station No. and site identification No. | Land-use categories, in percentage of basin area | | | | | | |
|---|---|--|-------------------|-----------------------|-----------------------|--------------------|------------|--------------|
| | | Reservoirs | Forested wetlands | Non-forested wetlands | Mines and gravel pits | Transitional areas | Wet tundra | Unclassified |
| Thames River Basin | | | | | | | | |
| 1 | 01121000 | 1.1 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 |
| 2 | 420420072010001 | .7 | 7.5 | .0 | .3 | .2 | .0 | .0 |
| 3 | 01125100 | 1.2 | 1.2 | .0 | .4 | 1.3 | .0 | .0 |
| 4 | 01126850 | .9 | 2.4 | .3 | .3 | .5 | .0 | .0 |
| Connecticut River Basin | | | | | | | | |
| 5 | 01131400 | 0.3 | 2.5 | 0.5 | 0.0 | 0.0 | 0.1 | 7.7 |
| 6 | 01135300 | .0 | .0 | .0 | .0 | .0 | .0 | .0 |
| 7 | 01153150 | .3 | .9 | .3 | .1 | .0 | .1 | 2.2 |
| 8 | 01163200 | 1.3 | 5.1 | .6 | 1.0 | .0 | .0 | .0 |
| 9 | 01170500 | .3 | 1.2 | .3 | .1 | .1 | .0 | 1.5 |
| 10 | 01171500 | .0 | 1.1 | .3 | .1 | .0 | .0 | .0 |
| 11 | 01175500 | 19.0 | 4.4 | .1 | .0 | .0 | .0 | .0 |
| 12 | 420910072200001 | .4 | 5.5 | .2 | .6 | .1 | .0 | .0 |
| 13 | 01183850 | .7 | 1.6 | .2 | .1 | .1 | .0 | 1.2 |
| 14 | 01184490 | .5 | .0 | .0 | 3.9 | .0 | .0 | .0 |
| 15 | 415645073025001 | .0 | .3 | .3 | .7 | .7 | .0 | .0 |
| 16 | 01189000 | 1.5 | .0 | .0 | .2 | .5 | .0 | .0 |
| 17 | 01191000 | 1.1 | 2.2 | .0 | .2 | .0 | .0 | .0 |
| 18 | 01192500 | .4 | .3 | .0 | .4 | .0 | .0 | .0 |
| 19 | 413615072423001 | 1.5 | .0 | .0 | .0 | .0 | .0 | .0 |
| 20 | 01192883 | .0 | .0 | .0 | .4 | .0 | .0 | .0 |
| 21 | 01192990 | .7 | 1.5 | .2 | .2 | .1 | .0 | 1.1 |
| Housatonic River Basin | | | | | | | | |
| 22 | 422640073144501 | 0.0 | 5.8 | 0.0 | 0.8 | 0.1 | 0.0 | 0.0 |
| 23 | 422102073142201 | .9 | 3.9 | .0 | .4 | .0 | .0 | .0 |
| 24 | 01198000 | .0 | 1.7 | .0 | .1 | .0 | .0 | .0 |
| 25 | 01198200 | .0 | 1.5 | .0 | .5 | .0 | .0 | .0 |
| 26 | 01200000 | .2 | .4 | .1 | .3 | .1 | .0 | .0 |
| 27 | 01201335 | 1.0 | 2.1 | .0 | .3 | .0 | .0 | .0 |
| 28 | 414640073071001 | 1.6 | .0 | .0 | .0 | .1 | .0 | .0 |
| Long Island Sound Coastal River Basins | | | | | | | | |
| 29 | 413345072531001 | 1.2 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 |
| 30 | 01196580 | .0 | .7 | .0 | .8 | .0 | .0 | .0 |
| 31 | 01208869 | 1.2 | .0 | .0 | .0 | .0 | .0 | .0 |
| 32 | 01209710 | .2 | .0 | .0 | .0 | .0 | .0 | .0 |