

# Health Consultation

---

Public Health Evaluation of Fish Contaminant Data in the  
Housatonic River

LAKE ZOAR, LAKE LILLINONAH, WEST CORNWALL,  
FALL'S VILLAGE, AND BULL'S BRIDGE IN KENT,  
CONNECTICUT

**Prepared by the  
Connecticut Department of Public Health**

April 26, 2010

Prepared under a Cooperative Agreement with the  
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR Toll Free at  
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

## HEALTH CONSULTATION

Public Health Evaluation of Fish Contaminant Data in the  
Housatonic River

LAKE ZOAR, LAKE LILLINONAH, WEST CORNWALL,  
FALL'S VILLAGE, AND BULL'S BRIDGE IN KENT,  
CONNECTICUT

Prepared By:

Connecticut Department of Public Health  
Under Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

## SUMMARY

### INTRODUCTION

---

The Housatonic River is approximately 149 miles long, beginning in the Berkshire mountains in western Massachusetts and flowing south, through western Connecticut into the Long Island Sound (Appendix A). The General Electric (GE) facility, which produced and handled polychlorinated biphenyls (PCBs) from the 1930s to 1977 in its Pittsfield, Massachusetts facility, caused significant contamination of Housatonic River sediments and fish in the Massachusetts portion of the river. PCB-contaminated sediments have been transported into the Connecticut portion of the river over the years. This has resulted in fish becoming contaminated with PCBs to the extent that fish consumption advisories have been in place in several parts of the Housatonic River in Connecticut since 1977. The Connecticut Department of Public Health (CTDPH) reviews new fish tissue data sampled by the Philadelphia Academy from the Housatonic River biennially and evaluates whether the current fish consumption advisory needs to be modified to protect public health based on the level of PCB contamination. CTDPH has evaluated fish sampling data from 2008 and the results of this evaluation are the focus of this document.

### CONCLUSION

---

ATSDR reached 1 important conclusion in the health consultation:

CTDPH has concluded that eating five fish species from West Cornwall, Lake Lillinonah, Lake Zoar, Bull's Bridge, and Fall's Village over a long period of time could harm people's health if they do not follow the consumption advisory. If community members adhere to the consumption advisory, exposure to PCBs in fish would not be significant enough to cause adverse health effects. CTDPH believes that this consumption advisory is necessary to protect public health while allowing community members to benefit from the nutritional advantages of eating fish.

### Basis for Conclusion

The current PCB levels (based on 2008 data) are elevated enough to warrant a continued consumption advisory. CTDPH has also decided to maintain the advisory of "do not eat-everyone" for brown trout and northern pike because PCB levels in these species have continued to be consistently elevated throughout the Housatonic River and its Lakes. A trend over time towards lower PCBs has been observed for the three other fish species (smallmouth bass, yellow and white perch sampled in five locations, however, the levels have not decreased enough to loosen the consumption advisory. In addition, it is becoming more

apparent that levels of PCBs in some fish species are beginning to stabilize.

#### Next Steps

- CTDPH along with CTDEP and GE will continue to work with CTDPH will update its Housatonic River fish consumption advisory in the spring of 2010 in response to the 2008 fish sampling data. The advisory will be printed in our annual brochure and distributed to towns and local health departments along the Housatonic River. In addition, CTDPH plans to restructure the brochure to make it easier to read and understand.
- CTDPH is planning another “Train the Trainer” session in the future for the Housatonic River community
- CTDPH will continue to evaluate new fish contaminant data and will update its current Housatonic River fish consumption advisory as needed.
- CTDPH will continue to review its fishing sampling protocol periodically and modify it as appropriate.

---

#### FOR MORE INFORMATION:

If you have concerns about your health, you should contact your health care provider. Please call The CT DPH at (860)-458-FISH for more information on Connecticut’s fish consumption advisories.

*The conclusions and recommendations in this health consultation are based on the data and information made available to the Connecticut Department of Public Health (CTDPH) and the Agency for Toxic Substances and Disease Registry (ATSDR). CTDPH and ATSDR will review additional information when received. The review of additional data could change the conclusions and recommendations listed in this document.*

## **BACKGROUND AND STATEMENT OF ISSUE**

The Housatonic River is approximately 149 miles long, beginning in the Berkshire mountains in western Massachusetts and flowing south, through western Connecticut into the Long Island Sound (Appendix A). Its major tributaries are the Williams, Green and Konkapot Rivers in Massachusetts, the Tenmile River in New York, and the Shepaug, Pomperaug, Naugatuck, and Still Rivers in Connecticut. It receives the Naugatuck River at Derby, Connecticut, and the Still River south of New Milford, Connecticut. The General Electric (GE) facility, which produced and handled polychlorinated biphenyls (PCBs) from the 1930s to 1977 in its Pittsfield, Massachusetts facility, caused significant contamination of Housatonic River sediments and fish in the Massachusetts portion of the river. PCB-contaminated sediments have been transported into the Connecticut portion of the river over the years. This has resulted in fish becoming contaminated with PCBs to the extent that fish consumption advisories have been in place in several parts of the Housatonic River in Connecticut since 1977. The Patrick Center for Environmental Research, Academy of Natural Sciences of Philadelphia (Philadelphia Academy) samples fish in the Housatonic River for GE on a biennial basis and reports this information to the Connecticut Department of Public Health (CTDPH) and Connecticut Department of Environmental Protection (CTDEP) Fisheries Program. The sampling locations were chosen in the 1970s and remain in place for the purpose of evaluating temporal trends. CTDPH reviews new fish tissue data sampled by the Philadelphia Academy from the Housatonic River biennially and evaluates whether the current fish consumption advisory needs to be modified to protect public health based on the level of PCB contamination. This sampling program has been in place since 1984 (EPA 2005). CTDPH has evaluated fish sampling data from 2008 and the results of this evaluation are the focus of this document.

### *Demographics*

Since the area surrounding the Housatonic River in Connecticut is very large, the demographics described here include only the towns surrounding the five stations where fish sampling occurred: West Cornwall, Bull's Bridge in Kent, Fall's Village, Lake Zoar, and Lake Lillinonah (Appendix A). As seen in Table 1, some of the nearby populations are large because the Lakes are surrounded by several towns. However, this is a very conservative estimate of a population that may be affected. We do not expect such a large number of people to fish in these five sampling areas along the Housatonic River.

The Housatonic River is a popular fishing destination for people across all of Connecticut and even for people from out of state. Therefore, these demographics for local towns do not necessarily reflect the true nature of the people fishing on the river.

**Table 1. Demographics for Fish Sampling Locations along the Housatonic River<sup>^</sup>**

<b>Sampling Station</b>	<b>Surrounding Towns</b>	<b>Total Population</b>	<b>Area (square miles)</b>
West Cornwall	West Cornwall	1,434	46
Bull's Bridge	Kent	2,858	50
Fall's Village	Fall's Village	1,052	33
Lake Zoar	Monroe, Oxford, Newtown, Southbury	72,666	194.39
Lake Lillinonah	Brookfield, Bridgewater, Newtown, Southbury, New Milford	88,207	156.02

<sup>^</sup>United States Census Bureau 2000

### *Health Comparison Values and Fish Tissue Contaminant Levels*

In the summer and fall of 2008, thirty brown trout were sampled from West Cornwall and analyzed for PCB content as part of the Housatonic River's biennial fish monitoring program described previously. In addition, 40 smallmouth bass from the four stations along the Housatonic River (West Cornwall, Bull's Bridge, Lake Zoar, and Lake Lillinonah) were also sampled. Twelve northern pike from four stations (Bull's Bridge, Fall's Village, Lake Lillinonah, and Lake Zoar) were also sampled. Lastly, 11, samples of five-fish composites (10 yellow perch and 1 white perch) were analyzed as part of a supplemental fish sampling effort. All of the fish fillets (brown trout, northern pike, smallmouth bass, white and yellow perch) contained PCB levels that exceeded CTDPH's Modified Great Lakes Protocol PCB value for fish consumption which is described below (Patrick Center for Environmental Research 2009).

#### 1. Health Comparison Values

In order to set safe levels of PCBs in fish, CTDPH uses a modified version of the Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory (GLP) (1993). The risk-based PCBs fish concentration cutoffs for different meal frequencies developed in the GLP are listed in Appendix B. The GLP is a framework for setting risk-based fish consumption advisories in the Great Lakes states. Using the GLP, the Great Lakes Task Force developed a Health Protective Value (HPV) for PCBs of 0.05 µg/kg/day by using a "weight of evidence" approach which considered all of the existing toxicological values and studies (mostly human and monkey). The "weight of evidence" approach differs from a reference dose which typically uses a single critical study. The HPV is a unique value developed specifically for the Great Lakes sport fish advisory process. The development of the HPV was based on some key assumptions: average meal size for a 70 kg adult of one-half pound (227 grams) and a 50% reduction in PCB fish fillet content

(skin on, scales off fillet) through trimming and cooking losses of fatty portions of the fish. The goal of the advisory program was to limit PCB exposure to 3.5 µg/day (0.05 µg/kg/day \* 70 kg = 3.5 µg/kg/day). At this exposure level, cancer risks would not be expected to exceed 1 excess cancer in 10,000 exposed people and non cancer health effects would not be likely.

Concerning non-cancer health effects, there are several animal and human studies that resulted in a variety of adverse health effects from exposure to PCBs. The main effects from exposure to PCBs in animals include hepatic, dermal, immunological, and neurobehavioral development. Because the most sensitive effects are immunological and neurobehavioral development, the GLP Task Force tended to weigh more heavily on these studies when developing its HPV (Great Lakes Sport Fish Advisory Task Force 1993).

Cancer risks estimates for PCBs at the HPV of 0.05 ug/kg/day using the United States Environmental Protection Agency (US EPA) Cancer Slope Factor (CSF) of  $(7.7\text{mg/kg/day})^{-1}$  (95% upper bound confidence level estimate) and  $(5.5\text{ mg/kg/day})^{-1}$  (most likely estimate) are  $3.8 \times 10^{-4}$  and  $2.7 \times 10^{-4}$  respectively. If a population were exposed to PCB levels of 0.05 µg/kg/day (HPV) every day for 70 years (a lifetime), there would be a theoretical excess cancer risk of approximately 2 persons in a population of 10,000. This theoretical excess cancer risk is on the upper end of a generally acceptable range (1 in 10,000 to 1 in 1,000,000).

CTDPH's version of the GLP takes into account detection limit issues and the somewhat greater concern for higher risk individuals (Ginsberg and Toal, 1999). CTDPH allows for unlimited consumption at PCB levels up to 0.1 ppm (parts per million), the point where practical quantification of PCBs in fish becomes certain whereas the GLP allows unlimited consumption only up to 0.05 ppm.

High risk individuals include pregnant women, women planning to become pregnant within a year, breastfeeding women, or children under the age of six. Pregnant women or women planning to become pregnant are particularly sensitive because PCBs can be passed through the mother to the unborn fetus and can result in central nervous system (CNS) effects as well as others. Children under the age of six are also particularly vulnerable because they tend to eat more per body weight. In addition, the developing organs (brain and thyroid gland) of children can sustain permanent damage if exposure to PCBs occurs during critical growth stages. Breastfeeding women are also in the high risk group because PCBs can pass through breast milk and expose young children to PCBs. Low risk individuals include the remaining population. Table 2 gives the details of CTDPH's fish consumption advisory as it relates to PCB levels in fish samples.

Regarding the issue of higher risk individuals, the animal toxicology studies support an HPV that is in the same range for reproductive and other (immunological, dermal) endpoints. This suggests that *in utero* development is no more sensitive to PCBs than endpoints seen in adult animals. However, the evidence of low dose effects in humans is strongest for *in utero effects* (central nervous system development). This creates a



somewhat greater concern for pregnant women and women planning pregnancy (Ginsberg and Toal 1999).

Two short term studies in mink and rats also resulted in low dose developmental effects from exposure to PCBs. Therefore, CTDPH believes that there may be a greater sensitivity during *in utero* exposure such that recent exposures that do not involve a cumulative body burden (which is important to adult toxicity) could produce an adverse health effect. This uncertainty over PCBs pharmacokinetics and developmental outcomes supports a prudent avoidance (do not eat) approach for pregnant women for markedly elevated PCB concentrations (e.g. over 1 ppm). CTDPH's recommendation of "do not eat" for high risk groups for PCB levels in fish of 1.1-1.9 ppm differs from the GLP's approach which recommends a "1 meal per 2 months" restriction for fish consumption for all risk groups for PCB levels of 1.1-1.9 ppm (Ginsberg and Toal 1999). In addition, CTDPH's recommendation also differs from the GLP's approach which recommends a "one meal per week" restriction for all risk groups for PCB levels of 0.06-0.20 ppm (Table 2).

When using the HPV, setting limits based on cancer risk less than 1 in 10,000 would lead to severe restrictions on fish consumption overall (local or commercial) due to the widespread occurrence of low levels of PCBs in fish. This would result in the benefit of fish consumption to be lost in the interests of minimizing cancer risks. Given that the number of frequent consumers of locally caught fish in Connecticut may not be large, the theoretical 1 in 10,000 cancer risk is of less concern than if this were a population-wide exposure (Ginsberg and Toal 1999). Therefore, both CTDPH and The Great Lakes Protocol focus on prevention of non-cancer health effects of PCBs.

**Table 2. CTDPH's Modified Great Lakes Protocol for Fish Consumption<sup>^</sup>**

PCB Level (ppm <sup>*</sup> )	Consumption Advisory	
	Low Risk <sup>@</sup>	High Risk <sup>#</sup>
< 0.1	Unlimited Consumption	Unlimited Consumption
0.1-0.2	One meal per week	One meal per month
0.21 - 1.0	One meal per month	One meal per month
1.1 - 1.9	One meal every 2 months	Do not eat
> 1.9	Do not eat	Do not eat

<sup>^</sup> (Ginsberg and Toal, 1999)

<sup>\*</sup>Parts Per Million

<sup>@</sup>Includes all other groups not included in the high risk group

<sup>#</sup>Includes pregnant women, women planning to become pregnant within a year, nursing women, and children under 6 years old

## 2. Fish Contaminant Levels

The 2008 contaminant data show that average PCB concentrations in all of the fish fillets from the five Housatonic River sampling locations were above the concentration limit for unlimited consumption (0.1 ppm). Table 3 gives the average congener-based<sup>1</sup> PCB concentrations in five locations along the Housatonic River in the 5 fish species sampled in 2008.

### Smallmouth Bass

The average PCB concentrations for Bull's Bridge, Lake Lillinonah and Lake Zoar in smallmouth bass were 0.98, 0.85, and 0.92 ppm, respectively, while the average for West Cornwall was 60% higher at 1.46 ppm for the same species.

### Brown Trout

Brown trout were only sampled at the West Cornwall station. The average PCB concentration in this fish species was 1.87 ppm.

### Northern Pike

The average PCB concentration in northern pike in Fall's Village and Bull's Bridge was 3.69 and 1.97 ppm, respectively, while the averages were lower for Lake Lillinonah and Lake Zoar at 1.2 and 1.27 ppm, respectively, for the same species.

### Yellow Perch

The average PCB concentration in yellow perch in Bull's Bridge and Fall's Village were 0.45 and 0.53, respectively, while the averages were lower for Lake Lillinonah and Lake Zoar at 0.14 and 0.19 ppm, respectively, for the same species.

### White Perch

White perch were only sampled in at the Lake Zoar station. The average PCB concentration in this fish species was 0.60 ppm.

---

<sup>1</sup> The congener-based analysis method sums the concentrations of all individual congeners (up to 121) quantitated by the analytical method.

**Table 3. PCB Concentrations in Five Species of Fish Caught in Five Locations along the Housatonic River in 2008.**

<b>Location</b>	<b>Species</b>	<b>Number of Samples</b>	<b>Number of Individuals</b>	<b>Average (Congener*) PCBs (ppm ^) in 2008</b>	<b>Range (Congener Based) PCB (ppm)</b>
West Cornwall	Smallmouth Bass	10	10	1.46	0.69-4.29
Bull's Bridge	Smallmouth Bass	10	10	0.98	0.32-1.60
Lake Lillinonah	Smallmouth Bass	10	10	0.85	0.12-2.52
Lake Zoar	Smallmouth Bass	10	10	0.92	0.16-2.64
West Cornwall	Brown Trout	30	30	1.87	0.13-5.16
Fall's Village	Northern Pike	3	3	3.69	0.85-7.16
Bull's Bridge	Northern Pike	3	3	1.97	1.45-2.33
Lake Lillinonah	Northern Pike	3	3	1.2	0.55-2.11
Lake Zoar	Northern Pike	3	3	1.27	1.12-1.45
Bull's Bridge	Yellow Perch	3	15	0.45	0.40-0.50
Fall's Village	Yellow Perch	1	5	0.53	--
Lake Lillinonah	Yellow Perch	3	15	0.14	0.11-0.17
Lake Zoar	Yellow Perch	3	15	0.19	0.11-0.29
Lake Zoar	White Perch	1	5	0.60	--

\*The congener-based analysis method sums the concentrations of all individual congeners (up to 121) quantitated by the analytical method.

^Parts per Million

### 3. Time Trends

It is also informative to evaluate trends in contaminant levels in fish tissue over time. Table 4 gives the trend over time for average PCB contamination in the five locations in all 5 species of fish sampled. The average PCB levels have decreased greatly in all of the locations in all fish species sampled (except for northern pike) from a high of 7.25 ppm in West Cornwall in brown trout in 1992 to a low of 0.14 in yellow perch in Lake Lillinonah in 2008. It is important to note, however, that after several years of decreasing levels of PCBs in several fish species, the levels have increased slightly during the latest sampling period, although not significantly. This may indicate that PCB levels in some species have now stabilized. Overall, there has been a large decrease in PCB levels in all of the locations from the 1980's to the mid 1990's.

### 4. Data Evaluation Issues

In calculating average congener-based PCB concentrations, CTDPH used average concentrations for each species and sampling location rather than 95% upper confidence limits (UCLs). A 95% UCL provides a conservative estimate of the average concentration and is unlikely to underestimate the "true" average. However, there is a tendency to sample larger fish (an intentional bias) in the Housatonic River Sampling Program which is the source of the data used in this health consultation. This provides conservatism because larger fish tend to have higher PCB concentrations. For this reason, CTDPH decided that it was not necessary to calculate 95% UCLs. CTDPH is confident that the average PCB concentrations provide a conservative estimate of the "true" average.

**Table 4. PCB Level History along the Housatonic River in Five Locations  
1984- 2008**

<b>Location</b>	<b>Fish Species</b>	<b>Highest Average (Congener Based<sup>#</sup>) PCBs 1984-2004 (ppm<sup>@</sup>) (Year)</b>	<b>Average (Congener Based) PCBs (ppm) (Previous Year Sampled)</b>	<b>Average (Congener Based) PCBs (ppm) in 2008</b>
West Cornwall	Smallmouth Bass	3.77 (1988 <sup>*</sup> )	0.89 (2006)	1.46
Bull's Bridge	Smallmouth Bass	2.33 (1988)	1.08 (2006)	0.98
Lake Lillinonah	Smallmouth Bass	1.41 (1992)	0.35 (2006)	0.85
Lake Zoar	Smallmouth Bass	1.13 (1992)	0.58 (2006)	0.92
West Cornwall	Brown Trout	7.25 (1992)	1.21 (2006)	1.87
Fall's Village	Northern Pike	10.01 (2004)	1.27 (2006)	3.69
Bull's Bridge	Northern Pike	0.45 (2004)	0.77 (2006)	1.97
Lake Lillinonah	Northern Pike	1.09 (2004)	0.89 (2006)	1.2
Lake Zoar	Northern Pike	NPS <sup>^</sup>	1.33 (2006)	1.27
Bull's Bridge	Yellow Perch	1.14 (1984)	0.36 (2004)	0.45
Fall's Village	Yellow Perch	0.36 (2000)	0.49 (2004)	0.53
Lake Lillinonah	Yellow Perch	0.58 (1984)	0.14 (2004)	0.14
Lake Zoar	Yellow Perch	0.26 (1992)	0.17 (2004)	0.19
Lake Zoar	White Perch	1.26 (1988)	0.51 (2004)	0.60

<sup>#</sup>The congener-based analysis method sums the concentrations of all individual congeners (up to 121) quantitated by the analytical method.

<sup>@</sup>parts per million

<sup>\*</sup> Results for 1984-1990 were estimated by the Patrick Center for Environmental Research (2009) from aroclor-based data using regressions of the natural logarithm (ln) of the congener-based PCB concentration versus the ln of the aroclor-based PCB concentration of each fish species that were established with data from 1992 and 1994. The aroclor-based analysis method is a measurement of commercial mixtures of PCB compounds. Congener analysis was not measured before 1992.

<sup>^</sup>Not previously sampled.

## DISCUSSION

### *Exposure Pathway Analysis*

To evaluate potential exposures to the contaminated fish in the Housatonic River and its Lakes, CTDPH evaluated the fish tissue data and considered how people may be exposed to contaminants in the fish. The only possible pathway of exposure is via ingestion (eating the fish).

Environmental data show that fish in the 5 locations sampled along the Housatonic River and its Lakes (Zoar and Lillinonah) are contaminated with PCBs. Individuals who catch and eat fish in these water bodies would likely be exposed to PCBs in the fish fillets. In addition, their families and friends would also be exposed to PCBs if they eat the fish.

### *Public Health Implications for Adults and Children*

When determining the public health implications of exposure to hazardous contaminants, CTDPH considers how people might come into contact with contaminants and compares contaminant concentrations with health protective levels. When contaminant levels are below health-based comparison values, health impacts from exposure to those levels are unlikely. Contaminant levels exceeding comparison values do not indicate that health impacts are likely, but instead warrant further investigation. In this health consultation, CTDPH used a modified Great Lakes Protocol for fish consumption to set a health protective value (HPV) for PCBs in fish as described in the Environmental Contamination section of this document. As stated previously, this modified protocol is a risk-based protocol which takes into account detection limit issues and the somewhat greater concern for higher risk individuals.

Ingestion of five species of fish in the upper part of the Housatonic River and its Lakes which contain elevated levels of PCBs is a completed exposure pathway and is evaluated in this health consultation. Using CTDPH's Modified Great Lakes Protocol for Fish Consumption, we have classified each fish species according to its appropriate consumption category. CTPH has concluded that the five fish species from Lake Lillinonah, Lake Zoar, Bull's Bridge, Fall's Village, and West Cornwall contain elevated PCB levels where adverse health effects from ingestion of these fish can not be ruled out. Ingestion of these fish present a public health hazard to individuals who do not follow the consumption advisory. However, if community members adhere to the current consumption advisory, exposure to PCBs in fish would not be significant enough to cause adverse health effects. CTDPH believes that this updated consumption advisory is necessary to protect public health while allowing community members to benefit from the nutritional advantages of eating fish.

Table 5 gives the updated CTDPH fish consumption advisory in response to the 2008 PCB data from the five sampling locations along the Housatonic River and compares it to the previous advisory.

## 1. Smallmouth Bass

Environmental data indicate the average PCB levels in smallmouth bass from all 4 stations are above the concentration limit for unlimited consumption according to CTDPH's modified Great Lakes Protocol for fish consumption (Table 2). The average PCB levels in Bull's Bridge (0.98 ppm) Lake Lillinonah (0.85 ppm), and Lake Zoar (0.92 ppm), are within the "1 meal per month-everyone" restriction level (Table 2). However, average PCB levels in West Cornwall (1.46 ppm) which is located in the upper section of the Housatonic River are higher than in the two Lakes and Bull's Bridge located further south. The average PCB levels in this sampling station located in the upper part of the Housatonic River are within the "1 meal per 2 months, high risk group-do not eat" consumption restrictions. Since the levels of PCBs over time in smallmouth bass have not dropped low enough to loosen the consumption advisory, the CT DPH advisory of "1 meal per month-everyone" will remain in the Lakes (Lillinonah, Housatonic, and Zoar) on the Housatonic River and the advisory of "1 meal per 2 months, do not eat-high risk" will remain for the upper part of the Housatonic River.

In summary, CT DPH has decided to maintain the advisory at "1 meal per month-everyone" for the Lakes on the Housatonic River and "1 meal per two months, do not eat-high risk" for the upper part of the Housatonic River for the following reasons:

1. Past fish sampling has indicated moderately high levels of PCB contamination on this river.
2. Further sampling is necessary to show that PCB levels in bass are low enough to allow more consumption.

## 2. Brown Trout

In 2008, brown trout in the West Cornwall station had an average PCB level (1.87 ppm) which borders between the "1 meal per 2 months, do not eat-high risk" and the "Do not eat-everyone" restriction levels. CTDPH has decided to maintain the advisory of "Do not eat-everyone" for the following reasons:

1. Past fish sampling has indicated moderately high levels of PCB contamination on this river.
2. Further sampling is necessary to show that PCB levels in brown trout are low enough to allow more consumption.

### 3. Northern Pike

2008 is the third year that PCB levels in northern pike were sampled. While levels from Lake Zoar and Lake Lillinonah were within the “1 meal per 2 months, do not eat-high risk” restriction level, PCB levels in Fall’s Village and Bull’s Bridge, are much higher and fall within the “No not eat-everyone” consumption advisory action level of >1.9 ppm. Previous sampling results in 2004 from Fall’s Village indicated very high levels of PCBs in northern pike which were in the “do not eat-everyone” consumption advisory.

In summary, CTDPH has decided to maintain the advisory of “do not eat-everyone” for the following reasons:

1. Past fish sampling has indicated very high levels of PCB contamination on this river. This relatively high average PCB concentration was due to one fish with very high levels of PCBs (30 ppm) sampled in 2004. CT DPH believes this particular fish does not represent the fish in the Fall’s Village sampling station, but may have been a fish from the Pittsfield, Mass area. Even so, CT DPH has maintained an advisory based on these high PCB levels of “do not eat-everyone.”
2. Three sampling rounds have indicated that PCB levels in northern pike are generally high and should not be consumed.

### 4. Panfish (Yellow Perch<sup>2</sup>)

Environmental data indicate that panfish levels fall within the restriction level of “1 meal per month-everyone” restriction level for stations’ Bull’s Bridge and Fall’s Village. The PCB levels in Lake Lillinonah and Zoar are generally less than half of those sampled from the upper part of the Housatonic River (Bull’s Bridge and Fall’s Village).

CTDPH has decided to maintain the advisory for panfish (except for white perch) on the Housatonic River (and its lakes) of “1 meal per month-high risk, 1 meal per week-low risk” for the following reasons:

1. In 2006, PCB levels in some panfish in Lakes Lillinonah and Zoar were below the concentration limits for unlimited consumption. In 2008, the average PCB levels of yellow perch in the upper Housatonic River were in the “1 meal per month-everyone” restriction level. For the sake of simplicity, all panfish (except white perch) will remain in the same advisory. In addition, average PCB concentrations have stabilized in 2008 sampling data for yellow perch to above concentration limits for unlimited consumption.
2. Further sampling is necessary to show that PCB levels in panfish are low enough to allow more consumption.

---

<sup>2</sup> White perch is evaluated separately because PCB concentrations tend to be higher in white perch than in other panfish along the Housatonic River.



## 5. White Perch

White perch were only sampled in Lake Zoar. The average PCB level in 2008 was about half as high as its highest level which was sampled in 1988 and consistent with the results in the last round of sampling in 2004. White perch are currently within the “1 meal per month-everyone” restriction level. However, CTDPH has decided to maintain the advisory with white perch on the Housatonic River at “1 meal per 2 months/do not eat-high risk” on the upper Housatonic River and “1 meal per month-everyone” in Lake Lillinonah and Zoar for the following reasons:

1. Past fish sampling has indicated high levels of PCB contamination on this river.
2. Further sampling is necessary to show that PCB levels in white perch are low enough to allow more consumption (white perch were only sampled in one location).

CTDPH believes that this updated consumption advisory is necessary to protect public health while allowing community members to benefit from the nutritional advantages of eating fish.

**Table 5. Updated 2010 Advisory for Five Fish Species in the Housatonic River and its Lakes.**

Location	Fish Species	Consumption Advisory	
		Previous (2009)	Updated (2010)
Housatonic River above Derby Dam <sup>^</sup>	Smallmouth Bass	1 Meal per 2 Months /Do Not Eat – High Risk	No Change
	Brown Trout	Do Not Eat-Everyone	No Change
	Northern Pike	Do Not Eat-Everyone	No Change
	Panfish (Yellow Perch)	1 Meal per week/1 Meal per month-High Risk	No Change
	White Perch	1 Meal per 2 Months /Do Not Eat – High Risk	No Change
Lakes Zoar and Lillinonah	Smallmouth Bass	1Meal/Month-Everyone	No Change
	White Perch	1 Meal/Month-Everyone	No Change
	Panfish (Yellow Perch)	1 Meal per week/1 Meal per month-High Risk	No Change

<sup>^</sup>Includes West Cornwall, Fall's Village, and Bull's Bridge sampling locations.

## EVALUATION OF COMMUNITY CONCERNS

*The following is a list of general concerns that CTDPH has received in recent years through community meetings and inquiries from the public and community leaders:*

1. I eat fish often in the Housatonic River. Why have I not gotten sick?

*The PCBs present in fish in the Housatonic River are not present at levels that will make you acutely (immediately) sick. They are chronic toxins (i.e. they take a long time to cause an effect). The health effects of concern for PCBs are potential cancers and developmental problems in children/fetuses. PCBs accumulate in your body over time. The more PCB contaminated fish you eat, the greater the PCB levels that will build up in your body. PCB exposure is a particular concern to pregnant women because the exposure their unborn child receives through the mother can cause development, behavioral, and learning problems in children.*

2. I have eaten lots of fish from the Housatonic River. Is there medicine I can take to get rid of these chemicals?

*There is no medicine or other procedure to get rid of the chemicals your body has accumulated from eating fish. The chemicals will very slowly leave your body over time. If you follow the advisory you will decrease your exposure and allow your body the time needed to reduce the levels of the chemicals.*

3. Are there areas along the Housatonic River that have less contaminated fish?

*The Housatonic River (below Derby Dam) as well as Lakes Lillinonah and Zoar are areas that are less contaminated. You can safely eat a greater amount of fish from these areas.*

4. I am concerned that there are not enough signs along the river to alert people to this advisory. In addition, I am concerned that there may be a language barrier preventing people from understanding these signs.

*Signs are posted by conservation officers at every access point along the Housatonic River. If you need more signs, then contact the CTDEP, Bureau of Natural Resources to request signs. Consumption advisory signs in other languages have been prepared and are posted in areas where these populations are thought to fish. Recently, more signs have been placed in these areas in response to this concern.*

## **CONCLUSIONS**

Another round of fish tissue data shows that five different fish species from five locations along the Housatonic River continue to have elevated levels of PCBs. CTDPH uses this fish tissue data to issue a general fish consumption advisory for the northern section of the Housatonic River above Derby Dam. The current PCB levels (based on 2008 data) are elevated enough to warrant a continued consumption advisory. CTDPH has also decided to maintain the advisory of “do not eat-everyone” for brown trout and northern pike because PCB levels in these species have continued to be consistently elevated throughout the Housatonic River and its Lakes. A trend over time towards lower PCBs has been observed for the three other fish species (smallmouth bass, yellow and white perch sampled in five locations, however, the levels have not decreased enough to loosen the consumption advisory. In addition, it is becoming more apparent that levels of PCBs in some fish species are beginning to stabilize.

CTDPH has concluded that eating five fish species from West Cornwall, Lake Lillinonah, Lake Zoar, Bull’s Bridge, and Fall’s Village over a long period of time could harm people’s health if they do not follow the consumption advisory. If community members adhere to the current consumption advisory, exposure to PCBs in fish would not be significant enough to cause adverse health effects. CTDPH believes that this updated consumption advisory is necessary to protect public health while allowing community members to benefit from the nutritional advantages of eating fish.

## **RECOMMENDATIONS**

1. CTDPH recommends that the Connecticut Department of Environmental Protection (CTDEP) and General Electric (GE) continue to work together with CTDPH on their biennial fish sampling plan for the Housatonic River.
2. CTDEP Fisheries and GE should continue to work with CTDPH to educate fishing populations along the Housatonic River about the consumption advisory.

## **PUBLIC HEALTH ACTION PLAN**

### *Actions Taken*

1. CTDPH along with CTDEP Fisheries and GE have worked together to educate both the general public as well as minority fishing populations along the Housatonic River about the consumption advisory as well as other populations along the river. CTDEP, Bureau of Natural Resources has posted signs along the river to inform the public about the consumption advisory.
2. As a result of the 2004 sampling results, CTDPH held a “Train the Trainer” session in May 2007 to educate leaders in the Housatonic River community about

Connecticut's fish consumption advisory issues so that they will be able to educate other members of the community.

3. CTDPH has added questions to the 2008 CTDEP CREEL (angler) survey to gain information about the level of knowledge of the fish consumption advisory.

#### *Actions Planned*

1. CTDPH along with CTDEP and GE will continue to work together to educate the general public as well as minority fishing populations along the Housatonic River about the consumption advisory as well as other populations along the river.
2. CTDPH will update its Housatonic River fish consumption advisory in the spring of 2010 in response to the 2008 fish sampling data. The advisory will be printed in our annual brochure and distributed to towns and local health departments along the Housatonic River. In addition, CTDPH plans to restructure the brochure to make it easier to read and understand.
3. CTDPH is planning another "Train the Trainer" session in the future for the Housatonic River community.
4. CTDPH will continue to evaluate new fish contaminant data and will update its current Housatonic River fish consumption advisory as needed.
5. CTDPH will continue to review its fishing sampling protocol periodically and modify it as appropriate.

#### REFERENCES

EPA 2005. GE /Housatonic River Site in New England. Available at <http://www.epa.gov/boston/ge/sitehistory.html> . Assessed May 3, 2006.

Ginsberg and Toal 1999. Risk-Based Approach for PCBs Fish Consumption Advisories in Connecticut. Connecticut Department of Public Health. May 1999.

Great Lakes Sport Fish Advisory Task Force 1993. Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory. September 1993.

Patrick Center for Environmental Research. 2009. PCB Concentrations in Fishes from the Housatonic River, Connecticut , 1984-2008, and in Benthic Insects, 1978-2008. *prepared for the General Electric Company*. November 2009.

United States Census Bureau 2000. United States Census Bureau Website. Available at: [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en). Accessed on May 3, 2006.

## CERTIFICATION

The Health Consultation for the Public Health Evaluation of Fish Contaminant Data in the Housatonic River, Lake Zoar, Lake Lillinonah, West Cornwall, Fall's Village, and Bull's Bridge in Kent, Connecticut was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the ATSDR Cooperative Agreement Partner.



Greg Ulirsch

Technical Project Officer

Division of Health Assessment and Consultation (DHAC)  
Agency for Toxic Substances and Disease Registry (ATSDR)

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



Team Leader-Coop Agreement Program

CAT, DHAC, ATSDR

## **Preparers of the Report**

Sharee Major Rusnak, MSPH, ScD  
Epidemiologist  
Environmental Epidemiology and Occupational Health  
Connecticut Department of Public Health

### *ATSDR Regional Representative:*

William Sweet  
EPA/New England

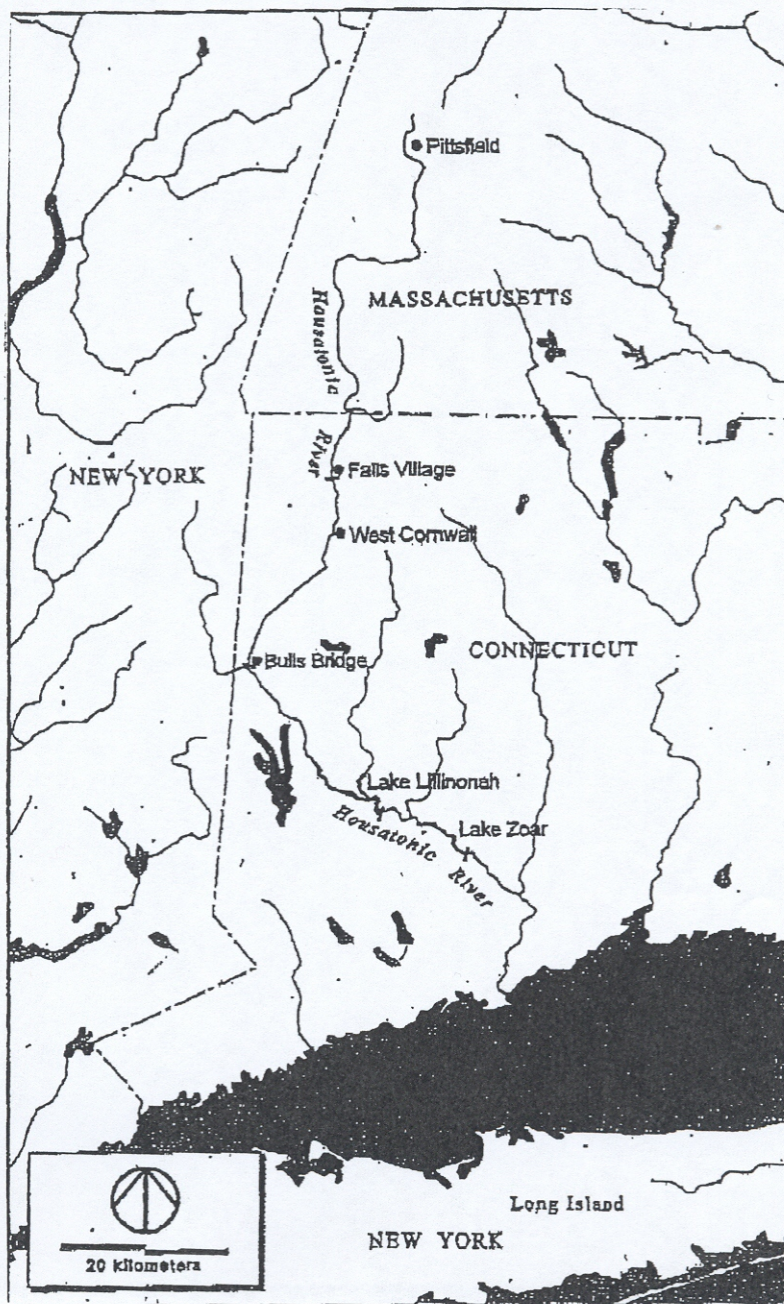
### *ATSDR Technical Project Officer:*

Greg Ulirsch  
Superfund Site Assessment Branch  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

## Appendix A

### Map of Sampling Locations along the Housatonic River







## Appendix B

### Risk Based PCB Fish Concentrations for Different Meal Frequencies Developed in the Great Lakes Protocol

- Unrestricted fish consumption for fish concentrations  $\leq 0.05$  ppm (assuming unrestricted is 1 meal every 1.6 days or 140 grams fish/day).
- One meal per week for concentrations 0.06 to 0.2 ppm
- One meal per month for concentrations 0.21 to 1.0 ppm
- One meal every other month for concentrations 1.1-1.9 ppm
- No consumption  $> 1.9$  ppm