

Health Consultation

TECHNICAL REVIEW OF THE CONNECTICUT RIVER FISH TISSUE
CONTAMINATION STUDY
ECOLOGICAL AND HUMAN HEALTH RISK SCREENING

CONNECTICUT RIVER, MA, CT, NH, AND VT

JUNE 28, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR 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 which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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CONNECTICUT RIVER, MA, CT, NH, AND VT

Prepared by:

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

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.

A. BACKGROUND AND STATEMENT OF ISSUE

The United States Environmental Protection Agency (USEPA) requested that the Connecticut Department of Public Health (CTDPH) review the draft 2006 Connecticut River Fish Tissue Contaminant Study and give comments and recommendations on the study. In addition, the US EPA requested that CTDPH answer specific questions regarding the study which are noted in the Discussion section of this document. CTDPH also evaluated the study for its applicability to Connecticut's mercury and polychlorinated biphenyls (PCBs) fish consumption advisory which is updated every year based on sampling results from the Connecticut Department of Environmental Protection (CTDEP). This evaluation is included in the Discussion section of this health consultation.

The Connecticut River Fish Tissue Contaminant Study was designed as a collaborative federal and state project to address deficiencies in previous state-specific studies, including differing methods of target species selection, fish collection, sample preparation and handling, and laboratory analysis. The broad goals were to provide comparable screening-level data on fish tissue contaminant levels throughout the watershed in support of human health and ecological risk assessments and fish consumption advisories.

Smallmouth bass, yellow perch, and white suckers were sampled in 2000 in the mainstem of the Connecticut River and analyzed for total mercury, coplanar (dioxin-like) PCBs, dichlorodiphenyltrichloroethane (DDT) homologs, and organochlorine pesticides. Fillets from twelve of these fish were also analyzed for dioxins and furans. Levels of contaminants were compared to the USEPA and other current human health and ecological risk screening criteria. Fish were collected by river reach (See Appendix A) and levels of contaminants were compared between reaches (river portions) and species. Reach 1 and part of Reach 2 of the Connecticut River are located in Connecticut. State of Connecticut fish hatchery raised brook trout were used as a "control" fish species against which to compare wild species contaminant levels. Fish weight, length, "condition" (a measure of health) and age (of selected smallmouth bass) among reaches were also collected and compared. See Appendix B for a Connecticut specific contaminant concentrations analyzed in the study.

New England's largest river, the Connecticut River, extends from Fourth Connecticut Lake in Pittsburg, New Hampshire on the Canadian Border heading south linking the states of New Hampshire and Vermont down through Massachusetts and Connecticut and

emptying into Long Island Sound. The Connecticut River watershed encompasses about 11,260 square miles and the main stem is 410 miles long (CRJC 2006).

Historical and ongoing pollution of the Connecticut River has had impacts on fish and wildlife population and potentially on human health. Coincident with the finding of the USEPA in 1970, the New Hampshire State government issued the first fish consumption advisory (fish advisory) for mercury in Connecticut River fish. As fish contaminant surveys expanded to other states in the watershed, Federal and State governments issued further fish advisories (Hellyer 2006).

The processes of agricultural abandonment, industrialization, and urbanization in New England lead to a marked impairment of the river's water quality. By the 1970s, the Connecticut River was referred to as a "landscaped sewer" (USEPA 2000). New England's rivers were among the most polluted in the nation, prior to the Clean Water Act and other pollution control legislation (Robinson et. al., 2003).

The CTDPH issued its first fish consumption advisory for the Connecticut River in the mid 1980s after sampling results indicated that PCB concentrations in carp and catfish fillets were elevated. CTDPH then issued an advisory of "1 meal per 2 months" for consumption of catfish for people in the low risk group and "Do not eat" for people in the high risk group. In 1990, CTDPH issued an advisory of "1 meal per month" for people in the low risk group and "do not eat" for people in the high risk group for carp. In addition to the PCB consumption advisory, the Connecticut River is under a statewide consumption advisory based on mercury contamination.

B. DISCUSSION

Child Health Issues

In reviewing the study, CTDPH gave special consideration to the exposures and risks of children.

CTDPH Comments on the Connecticut River Fish Tissue Study

The USEPA developed the following questions for reviewers to address in their review of the study. Each question, along with CTDPH's response, is provided below.

1) Does this report provide a scientifically thorough and defensible analysis and interpretation of the results and why or why not? Please answer in terms of your expertise in either ecological risk or human health risk screening.

The Connecticut River study is very thorough and will be useful with regards to CTDPH's fish consumption advisory. CTDPH will compare the mercury tissue data with CTDEP collected data and issue/modify the CT River consumption advisory if the mercury levels are elevated enough to warrant an advisory. CTDPH already has a statewide consumption advisory based on mercury concentrations in fish tissue. A separate one on the River will be issued if the mercury levels in fish tissue are significantly higher than average statewide tissue mercury levels.

Since actual tissue concentrations for coplanar PCBs and dioxin/furans, DDT homologs and organochlorine pesticides are not yet available, they will be evaluated at a later date. CTDPH will compare PCB tissue levels to those already collected from the river and issue/modify the consumption advisory if the fish tissue levels are elevated enough to modify the current advisory. In addition, the DDT homolog and organochlorine pesticide tissue levels will be evaluated to determine if an advisory on the river is warranted based on elevated fish tissue concentrations of these contaminants.

The statistical analyses in the study is also very thorough; however, it would be helpful if a more indepth discussion of the results was included. The statistical graphs are a little bit confusing and it would be useful to have a better overall summary of the “bigger picture.”

The methods of data validation are also very thorough.

In order to further clarify the conclusions in the study, it is recommended that the USEPA use bullets or a table to summarize all of the findings (not just key findings).

2) What weaknesses do you see in the current report and study and how might those weaknesses be addressed? Suggestions for how this report might be improved?

The following is a suggestion on how the study could be improved and more useful to CTDPH's program:

Since CTDPH and other state health departments currently use total PCBs as a basis for its consumption advisory, it would be more helpful if they would be included in the analyses of this study.

3) What additional studies are needed and how could future studies be improved?

a) CTDPH concurs agree with the USEPA's suggestion in the 2006 Fish Tissue Contaminant Study about sampling fish for PBDEs in the Connecticut River. CTDPH recognizes that PBDEs are an emerging issue and are taking steps to monitor their prevalence in its waterbodies. CTDPH welcomes the USEPA's efforts to sample fish for PBDEs.

b) CTDPH recommends that the USEPA include fish species that are already in New England's consumption advisories for contaminants in the Connecticut River. Even though the fish species chosen for the study are good representatives of the CT River, there are other species (common carp and catfish) that have been found to have much higher levels of contaminants in their fillets and they are not represented. CTDPH realizes that the EPA Guidance document recommends using white sucker for screening level studies, but using catfish or common carp would have been more useful to CTDPH. Past sampling by CT DEP has indicated that PCB levels in carp

and catfish are moderately high in the River, which has prompted a fish consumption advisory.

c) CTDPH recommends that the location of the fish sampling data within reaches could be useful if the data varies greatly. Currently, CTDPH has issued advisories on portions of some Connecticut rivers instead of the entire river as in the Housatonic River.

Additional Comments:

1) Comments regarding the USEPA screening levels for subsistence and recreational fishing:

a) These screening levels do not take into account sensitive populations like pregnant women or women of child bearing age, young children, and nursing mothers. Modified screening levels may need to be developed for these sensitive populations. Since CTDPH as well as other states take into account sensitive populations in its advisory, data in this study would be more useful to CTDPH if these populations would be taken into account when developing screening levels.

b) The USEPA should consider adding this point to the study if it is not already included:

“Multiple contaminant exposure is significant for Native American subsistence fishers. A large number of contaminants are often detected in fish tissues and their combined risk associated with the higher consumption rates and dietary preferences for certain fish parts could be very high even if individual contaminants do not exceed the USEPA reference dose (Harper and Harris, 1999).”

2) Comment (page 19) –There was additional PCB sampling performed in 2002 and 2003 for catfish and carp in Connecticut. Please call the Connecticut Department of Environmental Protection for more information. In addition, CT has a statewide consumption advisory for mercury in all waterbodies and all fish besides trout (which are stocked) for both high and low risk groups. Page 19 incorrectly states that CT has a mercury advisory only for sensitive or high risk groups.

CONCLUSIONS

A variety of fish sampled from the several points along Connecticut River are contaminated with elevated levels of PCBs, mercury, organochlorine pesticides, DDT homologs, and furans. The broad goals of the study were to provide comparable screening-level data on fish tissue contaminant levels throughout the watershed in support of human health and ecological risk assessments and fish consumption advisories. The study was very thorough and the data will be useful to CTDPH with regards to our fish consumption advisory. CTDPH will compare the mercury tissue and other tissue contaminant levels to previous contaminant data and update the Connecticut River consumption advisory as appropriate.

RECOMMENDATIONS

- Although the statistical analysis was also very thorough, it would be helpful to have a more thorough summary of the “overall picture” of what the results mean.
- CTDPH also recommends that total PCBs be calculated in the study since we use them as a basis for our consumption advisories.
- It would also be useful if PBDEs would be analyzed in future studies since they have become an emerging issue of concern in Connecticut as well as other states.
- Since CTDPH has an advisory for catfish and carp in the Connecticut River, it would be useful if these fish were included as a screening fish in future studies of the River.
- If possible, it would be useful if contaminant data would be available for areas within reaches if the data varies greatly. CTDPH is available to review any additional fish contaminant data that the USEPA collects from Connecticut River.

D. PUBLIC HEALTH ACTION PLAN

Actions Taken

1. As requested by the US EPA, CTDPH has provided input to the USEPA for their consideration.

Actions Planned

1. CTDPH will discuss these comments with the USEPA, as needed.
2. CTDPH will continue to review fish contaminant data on the Connecticut River, as requested.
3. CTDPH will compare the fish tissue contaminant levels from the CT River found in this study and all future USEPA studies with levels found in fish tissue collected from CTDEP sampling events and evaluate whether the current consumption advisory on the Connecticut River will need to be modified based on these new data.

REFERENCES

CRJC. 2006. Connecticut River Joint Commissions. Available at: <http://www.crjc.org>. Assessed on May 10, 2006.

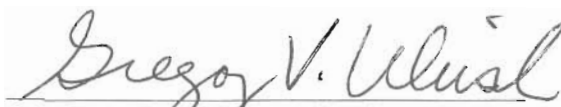
Hellyer, Greg. 2006. Connecticut River Fish Tissue Contaminant Study- Ecological and Human Health Risk Screening. *draft version* The United States Environmental Protection Agency. May 2006.

Robinson, K.W., Campbell, J.P., and Jaworski, N.A. 2003. Water Quality Trends in New England Rivers During the 20th Century, Water Resources Investigations Report 03-4012, United State Geological Survey National Water-quality Assessment Program.

USEPA 2000. State of the Environment. United States Environmental Protection Agency-New England, Boston, MA., 38 pp.

CERTIFICATION

The Health Consultation for the Technical Review of the Connecticut River Fish Tissue Contaminant Study-Ecological and Human Health Risk Screening, Connecticut River, MA, CT, NH, and VT 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.

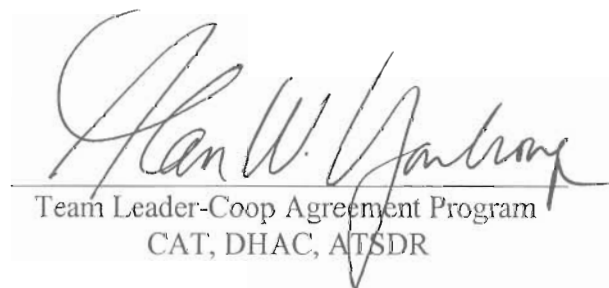


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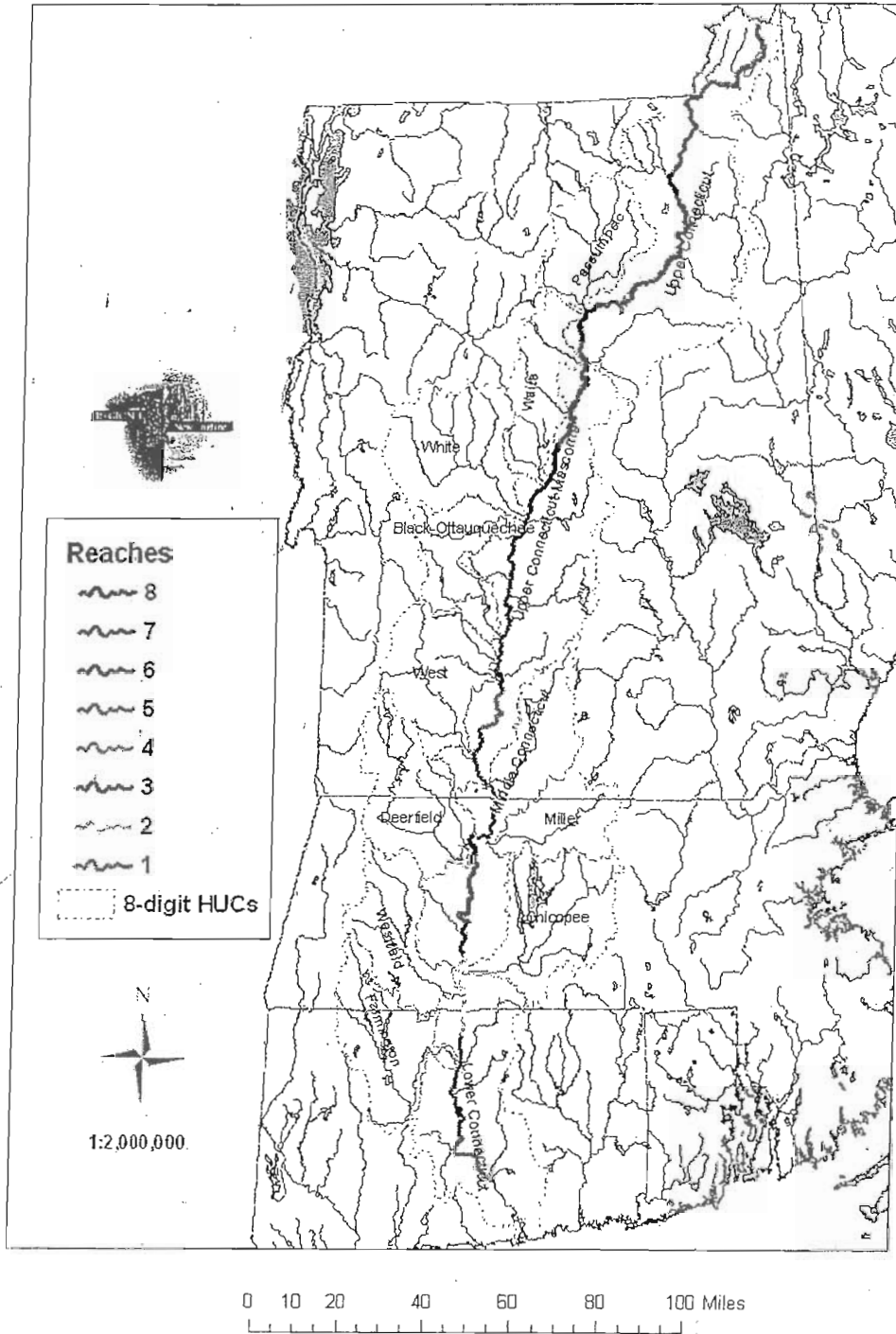
The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



Team Leader-Coop Agreement Program
CAT, DHAC, ATSDR

Appendix A
Map of Reaches on the Connecticut River

Connecticut River Fish Tissue Sampling Reaches



Appendix B
Contaminant Concentrations found in Reach 1 and Reach 2 of the Connecticut River

Figure 1. Mercury Concentrations Found in Reach 1 and 2 of the Connecticut River

Fish Species	Reach	Average Concentration (Fillet) (ppm or parts per million)
Smallmouth Bass	1	0.19
Yellow Perch	1	0.09
White Sucker	1	0.12
Smallmouth Bass	2	0.29
Yellow Perch	2	0.15
White Sucker	2	0.14

Figure 2. Total Coplanar PCBs and Dioxin/Furan TEFs[^]

Fish Species	Reach	Total Coplanar PCB and Dioxin /Furan TEQs* (ppb)
Smallmouth Bass	1	0.00615
Yellow Perch	1	0.00345
White Sucker	1	0.0325

[^]Toxic Equivalency Factors (TEFs) are toxicity potency factors that are used to evaluate the toxicities of highly variable mixtures of dioxin compounds.

*Actual contaminant concentrations were not available

Note: Actual organochlorine pesticide and DDT homolog concentrations were not available.