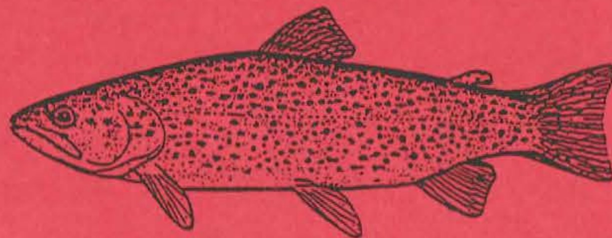
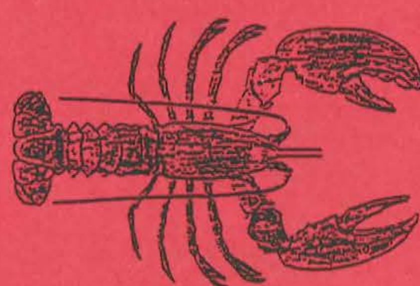
DEPLW96-3

DIOXIN MONITORING PROGRAM

STATE OF MAINE

1995





BY

BARRY MOWER

DEPARTMENT OF ENVIRONMENTAL PROTECTION

AUGUSTA, MAINE

July 1996

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ANGUS S. KING, JR.
GOVERNOR

EDWARD O. SULLIVAN
COMMISSIONER

July 25, 1996

Senator Willis Lord
Representative Edward Dexter
Joint Standing Committee on Natural Resources
Room 120 State Office Building
Augusta, Maine 04333

Dear Senator Lord, Representative Dexter and Members of Committee:

Enclosed is the Dioxin Monitoring Report, State of Maine, 1995 as required by 38 MRSA section 420-A. The report is a later than usual for a couple of reasons. First, the laboratory was very late in returning the results. We have solved that problem by selecting the University of Maine lab to do the analyses beginning this year. Second, we solicited the input of the Surface Waters Ambient Toxics monitoring program Technical Advisory Group to the report this year for the first time. Although this resulted in a further delay, the final report is better for it. We anticipate that next year's report will be more timely.

The 1995 program was the first year of a new two year schedule designed to make the program less expensive. (The trade off is that it will take twice as long to get the necessary amount of information.) The results show that dioxin levels at most sites were generally similar to those of 1994, but still much lower than in the early 1990's. We believe this is a result of the significant reductions in discharges from the mills at that time. As a result of new Federal cluster rules for bleached kraft pulp and paper mills due this year, we anticipate that additional reductions in discharges from the mills will result in even lower concentrations in fish, which hopefully will result in elimination of the fish consumption advisories by the year 2000 as called for by Governor King.

Nevertheless, concentrations of dioxin in fish from the Androscoggin, Kennebec, Penobscot, Presumpscot, Salmon Falls, and West Branch of the Sebasticook Rivers are still above the maximum acceptable concentration recommended by the Bureau of Health. Fish consumption advisories were issued in 1992 and remain in effect for the Androscoggin River, Kennebec River below Skowhegan, and Penobscot River below Lincoln.

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As in 1994, concentrations of dioxin in 1995 lobster tomalley samples also continued to exceed the maximum acceptable concentration recommended by the Bureau of Health. Although there was a slight downward trend, it was not statistically significant. An advisory remains along the entire coast for lobster tomalley. Concentrations in the meat are below the Bureau of Health's level of concern.

We will be sending copies of this report to the Department of Inland Fisheries and Wildlife and the Department of Marine Resources for their information and to the Bureau of Health for their review of the data and advisories.

Sincerely,

Edward O. Sullivan

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Acknowledgements

Successful collection of most of the samples was due to long hours and diligence of DEP conservation aide John Reynolds assisted by Dana Valleau, Francis Brautigam, Greg Beane and other DEP personnel. The assistance of Acheron Inc., specifically Mark Hein, on behalf of many of the facilities, also made the collection of fish possible in 1995. The help of Peter Henderson and Scott Davis in providing brown trout from the Kennebec River was invaluable. The Penobscot Nation supplied fish from Grindstone and South Lincoln which was greatly appreciated. Also, the assistance of the Department of Marine Resources and Department of Inland Fisheries and Wildlife in collection of samples and providing nets was very helpful.

EXECUTIVE SUMMARY

Statutory Requirements

The goal of Maine's Dioxin Monitoring Program, established in 1988 and amended in 1995 by the Maine Legislature, is "to determine the nature of dioxin contamination in the waters and fisheries of the State". Charged with administration of the program, the Department of Environmental Protection (DEP) is required to sample fish once a year below no more than 12 bleached pulp mills, municipal wastewater treatment plants, or other known or likely sources of dioxin. DEP is also required to sample sludge from the same facilities once each quarter to determine the sources.

The Dioxin Monitoring Program is to be coordinated with other ongoing programs conducted by the Department, the US Environmental Protection Agency and dischargers of wastewater. DEP is to be advised by the Surface Water Ambient Toxics (SWAT) Monitoring Program Technical Advisory Group in implementation of the program. DEP must incorporate the results of all studies into a report to the Legislature's Joint Standing Committee on Natural Resources during the following winter-early spring. Costs of sample collection and analysis are assessed to the selected facilities. In 1995 sample collection for this program was coordinated with that of the SWAT Program which facilitated sample collection for both programs.

Current advisories

Based on results from previous years, fish consumption advisories currently exist for the Androscoggin River, Kennebec River below Skowhegan, and Penobscot River below Lincoln. An advisory on lobster tomalley exists along the entire coast of Maine.

Changes in the 1995 Program

In 1995 the Dioxin Monitoring Program was modified such that only one of the two species of fish is sampled at each station each year. Although this reduces the cost of the annual program, it will now take two years to complete a sample of each station.

A persistent issue with dioxin monitoring and reporting nationwide has been how to accurately report a finding where dioxin has not been detected in a sample, i.e. non-detect. Such a finding may mean that the dioxin concentration approaches zero or, conversely, may approach the detection limit. Some states report non-detects as zero, some states use the full detection level, and still others use 1/2 the full detection level as recommended by EPA. In this report Dioxin Toxic Equivalents (DTE) are shown as a range with non-detects calculated at zero and at the detection level. Both ends of the range are then compared against the health standards. For comparison between years and stations only a single value is necessary, and DTE were calculated using non-detects at 1/2 the detection level. There are some new modeling approaches for treating findings of non-detect that are being investigated by EPA. DEP will monitor these efforts and select the most appropriate means for reporting non-detects in future reports.

Findings of the 1995 Program

1. Concentrations of TCDD and DTE in all fish samples collected below point source discharges to the Androscoggin River, Kennebec River, Salmon Falls River, and East Branch and West Branch of the Sebasticook River exceeded the Department of Human Services Bureau of Health's maximum acceptable concentrations (MAC) for the protection of consumers from an increased cancer risk of one in one million (10^{-6}) (0.15 ppt) or for protection of consumers from adverse reproductive effects (0.37 ppt).

2. Concentrations of TCDD and/or DTE in some fish from these rivers also exceeded the Bureau of Health's Fish Consumption Advisory Threshold (FCAT=1.5 ppt).

3. Concentrations of dioxin (TCDD) and dioxin toxic equivalents (DTE) in fish below point source discharges to the Androscoggin River, Kennebec River, Penobscot River, Salmon Falls River, and East Branch and West Branch of the Sebasticook River were found to be greater than those at reference stations unimpacted by point source discharges of TCDD and DTE. The concentration of TCDD in fish below the point source discharge to the Presumpscot River was greater than in fish from the reference site but DTE were higher at the reference site. This reference site had concentrations of DTE quite a bit higher than all the other reference sites in the state for the third consecutive year, suggesting another local source.

4. Concentrations of TCDD and DTE were generally similar to those of 1994 except for a statistically significant increase in DTE in bass from Lisbon Falls and a statistically significant decrease in DTE in brown trout at Fairfield. There were possibly other trends, which varied by station, but they were either not statistically significant or the specified sample sizes were too small to allow a meaningful statistical analysis. TCDD and/or DTE at most stations remained considerably lower than when first measured during the period from 1984-1991.

5. TCDD and DTE concentrations were highest in fish from the Androscoggin River compared to fish from other rivers as was the case in previous years.

6. TCDD and DTE concentrations in lobster tomalley were slightly lower than measured in 1994, continuing a downward trend since first measured in 1993, but the differences were not statistically significant. Concentrations at all stations remain at levels which prompted the Bureau of Health to issue a lobster tomalley consumption advisory in 1994 (Appendix 1). The Penobscot River Estuary, Presumpscot River Estuary, and Kennebec River Estuary had substantially (increasing in order) higher concentrations than their reference sites (Brave Boat Harbor in Kittery and Eggemoggin Reach in Brooklyn) as was the case in 1994.

INTRODUCTION

Maine's Dioxin Monitoring Program, established in 1988, was amended in 1995 and reauthorized through 1997 by the Maine legislature. The goal of the program is "to determine the nature of dioxin contamination in the waters and fisheries of the State". Charged with administration of the program, the Department of Environmental Protection (DEP) is required to sample sludge once a quarter from no more than 12 bleached pulp mills, municipal wastewater treatment plants, or other known or likely sources of dioxin. The Department is also required to sample fish once a year below the same facilities.

The monitoring program is to be coordinated with other ongoing programs conducted by the Department, US Environmental Protection Agency (EPA), or dischargers of wastewater. The proposed annual monitoring plan must be submitted to the Surface Water Ambient Toxics (SWAT) Technical Advisory Group (TAG), created under 38 MRSA section 420-B, for review and advice. The selected facilities must be notified of their inclusion in the proposed program at least 30 days prior to submittal to the TAG. The Department must seek to incorporate the results of all studies into a report due the Natural Resources Committee by 1 December of each year. A draft of the report will be reviewed by the TAG before completion of the final report. Costs of sample collection and analysis are assessed as a fee to the selected facilities. Payment of the fees is a condition of the waste discharge license granted by the state for continued operation and discharge of wastewater to waters of the State. However, if the selected facility is a publicly owned treatment works (POTW), then the fees may be assessed to the known or likely industrial generator of dioxin and payment will not be a condition of the waste discharge license of the POTW.

Due to continuing controversy over the effects of dioxin on human and ecological health, the US Environmental Protection Agency (EPA), announced that in 1991 it would begin a thorough scientific reassessment of dioxin. EPA proposed that the process would be open to the public and consequently held several meetings to share information and receive comments. Draft reports on a wide range of issues were available in 1992, 1993, and 1994. Initial results indicate that dioxin may exhibit reproductive and developmental effects, immuno-toxic effects, and neuro-toxic effects at concentrations nearly as low or lower than commonly thought to promote cancer (Frakes, 1992; Graham, 1992; Hughes, 1992; Silbergeld, 1992). In 1995 EPA's Scientific Advisory Board published its review of the draft reports recommending some additional work. New drafts are scheduled for release in 1996 for public comment with the final reports scheduled for later in the year.

For the purpose of water quality management, the Department of Human Services' Bureau of Health (BOH) has recommended the following maximum allowable concentrations (MAC) of 2378-TCDD in fish fillets in order to protect human consumers of contaminated fish against certain involuntary health risks (Frakes, 1990). "For a one in one million (10^{-6}) upper limit cancer risk the concentration of 2378-TCDD in the edible portion (fillets) of fish should not exceed 0.15 ppt (parts per trillion) and for a one in one hundred thousand (10^{-5}) upper limit cancer risk the concentration of 2378-TCDD in the edible portion (fillets) of fish should not exceed 1.5 ppt. For protection against adverse reproductive effects, the concentration of 2378-TCDD in the edible portion (fillets) of fish should not exceed 0.37 ppt (parts per trillion)." Although no risk concentration has been selected, the Board of Environmental Protection has used a risk of 10^{-6} in setting a limit for dioxin in the sludge spreading rules in 1986. For this report concentrations of dioxin in fish above any of these recommendations will be reported as exceeding BOH's recommended safe levels (MAC).

For managing the risk to consumers of fish already contaminated with dioxin, the BOH publishes fish consumption advisories for dioxin for particular waterbodies using risk assessment methods with a threshold (FCAT) of 1.5 ppt. Based on recent research, the BOH is also concerned with potential reproductive effects in women from consuming a single fish meal. There are a number of reports in the literature that document impacts ranging from enzyme effects to reproductive effects at different doses. Once EPA's Dioxin Reassessment is completed, an evaluation can be made of the effect of a single meal of fish from Maine rivers.

OBJECTIVES

Given the fact that beginning in 1991, concentrations of dioxins and furans have declined at some sites, but remained the same or increased at other sites, the primary objective of the 1995 program was to collect fish samples from the appropriate sites and species from each river such that accurate, complete, and current data are available to meet the overall goal of the program. The program design included sampling at least one site below each major source to document trends and sampling of historic sites that showed dioxin above the MAC, whether or not any fish consumption advisories were issued. Another criterion was to sample fish from any new sites or important species suspected of being contaminated with dioxin.

At sites affected by a single discharger, sampling will continue until there are at least two consecutive cycles for each species where dioxin is below the MAC and is not increasing. At sites affected by more than one discharger, each discharger will continue to be included in the annual sampling program until enough evidence has been gathered to demonstrate that dioxin is no longer present in the discharge in significant quantities. Such evidence must include, but not be limited to (1) at least 8 consecutive sludge analyses equally distributed over all seasons for a minimum of two years that show no 2378-TCDD detected at a suitably low detection level, (2) full congener analysis for all 2378 substituted dioxins and furans, (3) other pertinent information such as process changes, changes in hook-ups that show reductions in the level of dioxins being discharged to insignificant levels.

PROGRAM DESIGN

The 1995 program was initially drafted by a team representing DEP, BOH, the Department of Marine Resources (DMR) and the Department of Inland Fisheries and Wildlife (DIFW) according to the objectives listed above. Following a meeting with representatives of the participating facilities on 9 May 1994, the draft program was presented to the TAG and finalized on 15 May 1995.

In 1995, the annual program was modified from an annual cycle to a two year cycle, thereby reducing costs roughly by half. Prior to 1995, both predator fish (game fish) and omnivorous fish (suckers or bullheads) were collected at each site each year. Beginning in 1995, one species was collected at each site each year. Consequently it will take two years to complete sample collection of both predators and omnivores at each site. Collection of predators and omnivores was alternated sequentially among sites on each river that has more than one site, so that there were samples for both predators and omnivores on each of those rivers.

There was one reference station for each river unlike previous years where there was only one reference station for the whole program. At reference stations on each river with multiple test sites, both species were collected. On rivers with only one test site only one species was collected at reference stations.

Station locations along with specified fish species are shown in Table 1. Station location maps show exact locations of collections (Appendix 6). Test stations were generally similar to those in 1994. An exception was that in 1995 10 bass were captured from the East Branch of the Sebasticook River at Newport for the first time ever in this program.

Table 1. Sample stations, facilities, and species for the 1995 Dioxin Monitoring Program

STATION	FACILITY	SPECIES
Androscoggin R		
Gilead (ref)	both Andr R sources	bass, suckers
Rumford	Boise Cascade	bass
Jay (Bean Is)	Boise Cascade	sucker
Liv Fls(Otis imp)	International Paper	bass
Turner (GIP)	International Paper	sucker
Lisbon Falls	BC & IP	trout/bass
Kennebec R		
Madison (ref)	all Ken R sources	trout/bass, suckers
Shawmut Dam	SD Warren	trout/bass
Sidney	Scott Paper	sucker
Augusta	KSTD	trout/bass
Phippsburg	All: Andy and Ken	lobster tomalley
Penobscot R		
E.Branch (ref)	All Pen. R sources	bass, suckers
S Lincoln	Lincoln P&P	bass
Veazie	James River Co	bass,sucker
Stockton Springs	JR & LP&P	lobster tomalley
Presumpscot R		
Windham (ref)	SD Warren	suckers
Westbrook	SD Warren	sucker
Portland	SD Warren	lobster tomalley
Salmon Falls R		
Acton (ref)	Town of Berwick	bass
S Berwick	Town of Berwick	bass
Sebasticook R		
E Br		
Corinna (ref)	Town of Corinna	bass
Newport	Town of Corinna	bass
W Br		
Hartland (ref)	Town of Hartland	bass
Palmyra	Town of Hartland	bass
Lobster reference stations		
Brave Boat (S Me)	all	lobster tomalley
Brooklyn (E Me)	all	lobster tomalley

The preferred sampling time is late in the summer when fish are likely to be more contaminated after being exposed to higher concentrations of dioxin during low river flows and after significant growth has occurred. At some locations there has been a problem collecting enough fish later in the summer. At these, sampling began in mid-May to try to insure that a suitable sample was collected. These sites were also visited after the beginning of July. If fish were captured during the later period, those samples were submitted for analyses. Otherwise, the fish collected during the early period were used. Sampling at other sites began in July. Actual dates of collection are shown in Appendix 7.

As in previous years, ten game fish and ten bottom feeders were collected at most stations. For historic sites, predators were combined into 5 two-fish composites of skinless fillets, while the omnivores were combined into 2 five-fish composites of whole fish. On three rivers, Salmon Falls River and East and West Branch of the Sebasticook River, two composites of five predators were analyzed. For reference sites, fish were combined into the type of composite used at the test sites for that river. At some stations we were unable to collect ten fish of each species. Consequently, the fish collected were analyzed individually or combined into composites adjusted to be as close as possible to the specified number and size of the composites (Appendix 7). Each fish was ground and stored separately. Half of the ground sample of each fish was combined into the composites and the remaining tissue was archived in a freezer.

Since concentrations of dioxins and furans in the lobster meat was below the MAC for 2 consecutive years, 1993 and 1994, no meat was analyzed. However, concentrations in tomalley were highly elevated in all samples in both years, so the tomalley was analyzed. To ensure adequate replication, four composites of 5 tomalleys each was analyzed from each of two reference sites and three test sites (table 1).

In 1993 and 1994 lobsters from the various reference sites along the coast had elevated levels of dioxin in the tomalley. Lobsters are gathered for two consecutive years at each reference site. In 1995 reference stations for lobsters were Brave Boat Harbor in Kittery for the second year and Brooklyn, a substitute for the second year for Machias, where lobsters were not successfully captured. Twenty lobsters from each reference and test site were divided into 4 composites of five animals each. Only the hepatopancreas (tomalley) was analyzed.

Results of the 1994 program showed that other congeners added significantly to the DTE at some sites. Therefore, all samples in the 1995 program were analyzed for all the 2378 substituted congeners to provide complete, accurate, and current data. All samples were also analyzed for coplanar PCBs, funded by the SWAT program, and discussed below.

SAMPLING PROCEDURES

Fish were collected by DEP with assistance of representatives of the participating facilities and selected volunteer anglers. Upon capture, fish were immediately killed, weighed and measured, rinsed in river water, wrapped in aluminum foil with the shiny side out, labelled, and placed in a cooler on ice for transport to the lab. Lobsters were purchased directly from commercial fishermen at each site and placed in plastic garbage bags in a cooler on ice for transport to the lab. Chain of custody forms were used to record all field information and document all transfers.

In the DEP lab all samples were frozen to await shipment to Midwest Research Institute (MRI) in Kansas City, Missouri for analysis. Fish were sent whole to be filleted at MRI while lobster meats and tomalleys were removed from the shell by DEP personnel and shipped to MRI. All other procedures generally followed EPA's Sampling Guidance Manual for the National Dioxin Study (July 1984). A laboratory log was kept for an inventory of samples in the lab at any time and final disposition.

Most of the facilities in the program already sample sludge or effluent as part of their Maine Sludge Spreading Permit or Waste Discharge License or Federal NPDES permit. Data from those programs provide adequate information about sources of dioxin. Therefore, no additional sludge samples were collected as part of this program.

RESULTS AND DISCUSSION

We were unable to collect all species and numbers of fish targeted. A description of fish collected and analytical results follows for each sample location. Results show that in 1995, concentrations of dioxin in fish were generally similar to those in 1994 (Table 2, Appendix 2). Only two samples were statistically different between the two years. However, at stations where the fish were combined into two samples, no meaningful statistical analyses could be conducted due to the small sample size.

Both TCDD and DTE were detected in most of the samples. DTE are shown as a range with non-detects calculated at zero (DTE_0) and at the detection level (DTE_d). Therefore, the actual value falls somewhere within the range. TCDD, DTE_0 and DTE_d were each compared to the MAC and FCAT. TCDD and DTE_0 exceeded the MAC at only one reference station but DTE_d exceeded the MAC at all reference stations and in all method blanks, which demonstrates the uncertainty associated with non-detects at relatively high detection levels. TCDD and DTE_0 exceeded the MAC at all experimental stations and the FCAT at many, and DTE_d exceeded the FCAT at a few more stations.

Statistical analyses of differences in TCDD and DTE between stations and between years were performed using the Mann-Whitney test at $p=.05$. For these comparisons only a single value, rather than the range, is necessary. For this purpose, DTE_h were calculated taking non-detects at 1/2 the minimum detection level. This method has been suggested by EPA and their Science Advisory Board (SAB) in its review of the Dioxin Reassessment and by the DEP's SWAT Technical Advisory group. As also recommended by the SAB, a modelling approach to estimating a value for non-detects, such as the maximum likelihood method, is being investigated for future use. DEP will also work with the University of Maine Sawyer Environmental Research Center, which will now be conducting these analyses, to achieve better detection limits for the congeners, which will minimize the non-detect problem.

Androscoggin River

<u>Gilead</u> Fish were collected at this site for the first time since 1985 when EPA collected suckers here. In 1995 two smallmouth bass, two rainbow trout, and ten white suckers were collected near Peabody Island (Appendix 7). This site is upstream and serves as a reference for all Maine mills on the river, but is below the Crown Vantage bleached kraft mill in Berlin, New Hampshire and therefore is not unimpacted by the discharge of dioxin. Concentrations of both TCDD and DTE_0 in all three species were above the MAC and FCAT (Table 2).

DIOXIN MONITORING PROGRAM
1995 REPORT

ERRATA

Due to a computer glitch, in Table 2 the printer truncated the first digit for those DTE where the first number in the range was 10 or greater for all years except 1995, which was not affected. Enclosed is copy of correct values (with the corrected values shaded).

TABLE 2. DIOXIN AND FURAN LEVELS IN MAINE FISH AND SHELLFISH (pg/g)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86	DEP DIOXIN MONITORING PROGRAM 1988- 1990		19 91		19 92		19 93		19 94		19 95	
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
ANDROSCOGGIN R															
Gilead	rainbow trout													1.2	2.4-2.9
	bass													0.9	3.8-4.1
	sucker	w	1.8f/6.5w											1.7	6.1-6.7
Rumford	bass	f				1.4	2.3-2.8	0.6	1.0-1.2	2.9	4.5-5.4	3.8	5.7-6.2	2.2	3.5-4.1
	sucker	w						3.0	7.4-8.0	5.8	13.6-14.6	4.0	11.4-11.9		
Riley	sucker	w	2.1f/13w												
Jay	bass	f		17.6	24.0-29.1			1.2	1.9-2.3	1.4	1.8-2.2	1.6	2.2-2.8		
	sucker	w						5.4	12.9-13.9	4.5	10.9-11.8	4.7	11.5-12.3	2.3	6.9-7.6
Livermore Falls	bass	f				2.4	3.1-3.3	1.1	1.4-1.5	1.4	1.6-1.8	1.4	1.6-2.3	0.5	0.8-1.3
	sucker	w						3.8	7.4-8.0	3.6	6.8-7.3	2.2	4.8-5.3		
N Turner	sucker	w	6.2f/30w												
Turner-GIP	bass	f	3.7f/24w												
	sucker	w	8.3f/29w												
	bullhead	w	.8f/29.6w												
Auburn-GIP	bass sm	f						1.7	2.6-2.8	1.2	1.8-1.9	1.3	2.0-2.7		
	bass lm	f						1.1	1.6-1.8						
	sucker	w						5.6	14.3-15.4	3.7	9.0-9.8	1.6	4.4-5.4	1.4	3.8-5.0
	bullhead	w								2.1	3.0-3.3	1.3	2.3-2.8		
Lisbon Falls	trout	f		5.3	6.5-6.9										
	bass	f		4.5	5.5-5.8			0.7	1.0	1.2	1.7-1.8	0.6	0.8-1.7	0.9	1.4-2.4
	sucker	w	5.1f/12w					3.4	8.1-8.7	2.7	6.1-6.6	2.4	5.8-6.2		
Brunswick	sucker	w	19.0												
	carp	f	11.0												
BEARCE LAKE															
Baring	pickerel	f	<0.1												
BRAVE BOAT HARBOR															
Kittery	lobster	m										<0.1	<0.1-1.2		
	lobster	t										1.3	9.7-11.5	1.6	6.7-9.9
BROOKLYN	lobster	m												0.8	4.9-8.2
	lobster	t													

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86 TCDD	DEP DIOXIN MONITORING PROGRAM 1988- 1990 TCDD	1988- 1990 DTE	19 91 TCDD	19 91 DTE	19 92 TCDD	19 92 DTE	19 93 TCDD	19 93 DTE	19 94 TCDD	19 94 DTE	19 95 TCDD	19 95 DTE
JONES CREEK															
Scarborough	clam	m						<0.1	0.02-0.3						
KENNEBEC R															
Madison	trout	f												<0.1	0.1-0.7
	bass	f						<0.1	0.02-0.1						
	sucker	w						0.1	0.3					0.1	0.3-1.0
Fairfield	trout	f		6.2	6.9-8.0			1.4	1.6-1.8	1.4	1.6-1.9	2.2	2.5-3.8	1.6	1.7-2.5
	bass	f				1.4	1.6-1.7	0.6	0.6-0.7	1.5	1.7-2.0	0.9	1.1-1.8		
	sucker	w	6.4	10.3	16.8-18.1			2.0	3.1-3.3	1.6	2.2-2.6	2.2	2.9-3.8		
Sidney	bass	f	20.3w			1.0	1.4-2.4	0.4	0.6-1.0	0.6	0.8-1.4	0.3	0.4-1.3		
	sucker	w	.2f/11.4w					2.7	4.4-4.8	1.5	2.5-2.7	2.3	3.0-4.0	1.2	1.7-2.5
Augusta	trout	f		2.2	2.9-4.9			1.9	2.5-4.3					1.0	1.3-3.5
	bass	f						0.4	0.6-1.0	0.6	0.9-1.5	1.0	1.3-3.7		
	sucker	w		5.0	7.3-8.4			1.5	2.6-2.8	1.9	3.3-3.6	2.3	4.0-5.8		
Hallowell	smelt	c						0.2	0.5-0.8						
Richmond	eel	f								0.6	0.8-1.4				
Phippsburg	clam	m						0.3	0.6-0.9						
	lobster	m								0.2	0.3-1.2	<0.1	<0.1-1.6		
	lobster	t								7.9	27.5-27.6	6.5	23.4-26.6	4.6	13.5-17.1
MACHIAS BAY															
Machias	lobster	m										<0.1	<0.1-0.6		
	lobster	t										0.7	6.1-7.4		
MESSALONSKEE LAKE															
Belgrade	bass					<0.09	0.04-0.3								
NARRAGUAGUS R															
Cherryfield	fallfish	w	<1.0												
NORTH POND															
Chesterfield	sucker	w	0.4												
	pickerel	f	<0.1												

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86	DEP DIOXIN MONITORING PROGRAM 1988- 1990		19 91		19 92		19 93		19 94		19 95	
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
PENOBSCOT R															
E Br Grindstone	bass	f		<0.1	0.09-0.2									<0.1	0.1-0.7
	sucker	w		<0.4	0.02-0.6									<0.1	0.1-0.6
E Millinocket	bass	f		<0.2	0.4-0.8										
	sucker	w		0.7	3.6-4.2										
N Lincoln	bass	f		<0.4	0.2-0.8										
	sucker	w		<0.5-20.	2.0-41.6										
S Lincoln	bass	f	5.0	1.7	2.3-2.7	0.9	1.2-1.3	0.7	1.0-1.2	1.2	1.6-1.8	0.4	0.4-1.7	0.5	0.7-1.3
	sucker	w		37.0	66.4-67.2			3.3	6.8	1.7	3.5-3.6	2.2	5.8-6.1		
Passadumkeag	bass	f		1.8	2.9										
	sucker	w		2.8	7.6-7.7										
Milford	bass	f		0.9	1.4-1.7			0.3	0.4-0.5						
	sucker	w		9.7	19.9-20.1			2.2	4.6						
Veazie	bass	f	4.6w	1.9	2.4-2.6	1.2	1.5-1.7	0.4	0.6	0.6	0.8-1.0	0.2	0.2-1.3	0.3	0.4-1.9
	sucker	w	2.6f/7.6w	5.9	9.8-9.9	2.5	4.9-5.0	2.2	4.8-4.9	1.1	2.7-3.0	0.6	1.6-2.8	0.5	1.4-2.5
Bangor	eel	w								1.0	1.1-1.2				
Bucksport	clam	m						0.1	0.8-0.9						
Stockton Spring	lobster	m								0.1	0.3-1.1	<0.1	0.1-1.0		
	lobster	t								4.0	28.0	2.3	18.1-27.9	1.3	7.2-14.6
OWLS HEAD	mussel	m	<0.8												
PISCATAQUIS R															
Sangerville	bass	f				<0.2	0.03-0.3								
	trout	f				<0.4	0.03-0.4								
	sucker	w				0.26	0.6-0.7								
Howland	bass	f		<0.2	0.02-0.6										
PRESUMPSCOT R															
Windham	bass	f								<0.1	<0.1-0.3	<0.1	<0.1-1.1		
	sucker	w								0.3	0.7-0.8	0.2	1.4-2.4	0.3	2.4-7.7
Westbrook	bass	f		1.8	2.4-4.5	0.2	0.2-0.4	0.1	0.2-0.4	<0.2	0.1-0.5	0.2	0.3-1.2		
	pickerel	f		<2.6	0.06-5.9										
	w perch	f		1.2	2.5-3.1	0.4	0.9-1.0								
	sucker	w	5.2	5.1	8.2-9.6	0.6	1.6-1.7	0.3	0.8-0.9	1.1	1.8-2.3	0.9	2.1-3.7	0.8	1.6-2.6
Falmouth	clam	m						<0.1	0.2-0.4						
Portland	lobster	m								<0.1	0.1-0.8	<0.1	0.2-1.0		
	lobster	t								3.4	18.5-18.7	2.5	17.2-21.3	2.2	9.5-12.8

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA	DEP											
			NDS/NBS	DIOXIN MONITORING PROGRAM											
			1984-86	1988- 1990		19 91		19 92		19 93		19 94		19 95	
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
ST CROIX R															
Woodland	bass	f		0.3	0.5-1.0	<0.1	0.04-0.3								
Calais	sucker	w	<0.7	0.6	1.0-1.1										
ST JOHN R															
Frenchville	sucker	w										0.1	0.2-1.0		
Madawaska	y perch	f		<0.5	0.08-0.8										
	brook trout	f										<0.3	<0.1-2.3		
	sucker	w										<0.1	0.2-0.8		
SACO R															
Dayton	sucker	w	<0.3												
SACO BAY															
Scarborough	lobster	m								<0.1	0.1-0.8	<0.1	<0.1-0.8		
	lobster	t								2.0	11.3-14.6	1.3	9.7-12.0		
SALMON FALLS R															
Acton	bass lm													<0.1	<0.1-0.7
	sucker														
S Berwick	bass sm	f		0.4	0.5-0.6					0.2	0.2-0.9	0.5	0.7-3.3	0.4	0.4-4.0
	pickerel	f		0.2	0.3										
	sucker	w		1.5	2.1-2.2			2.4	3.4-3.6	1.9	3.6-3.8	2.1	4.7-6.1		
SANDY P															
	bass	f	<1.0												
SEBAGO L															
Naples	bass	w	<0.6												

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86 TCDD	DEP DIOXIN MONITORING PROGRAM 1988-1990 TCDD	1988-1990 DTE	1991 TCDD	1991 DTE	1992 TCDD	1992 DTE	1993 TCDD	1993 DTE	1994 TCDD	1994 DTE	1995 TCDD	1995 DTE
SEBASTICOOK R															
E Br Corinna	bass lm													0.1	0.2-1.1
	sucker														
Newport	bass sm	f						0.1	0.3-0.4						
	bass lm	f	<0.2					<0.2	0.2-0.4					0.3	1.1-2.0
	w perch	f		1.0	1.6-2.1										
W Br Harmony	bass													<0.1	0.1-0.8
	sucker														
W Br Palmyra	bass	f		1.2	1.4-1.8			0.4	0.5-0.6	0.9	1.2-1.6	0.4	0.4-1.3	0.8	1.7-2.2
	pickerel	f	<0.1					0.2	0.2						
	sucker	w	1.6	3.3	4.3-4.6			1.1	1.4-1.6	1.0	2.6-2.7	1.2	4.0-4.3		
WEBBER POND															
Vassalboro	bass	f				<0.08	0.04-0.4								

f = fillet
m = meat
t = tomalley
w = whole

DTE = dioxin toxic equivalents (range at nd = 0 and nd = mdl) using EPA 1989 toxic equivalency factors (TEF).

TABLE 2. DIOXIN AND FURAN LEVELS IN MAINE FISH AND SHELLFISH (pg/g)

WATER/STATIO	SPECIES	TYPE	EPA		DEP										
			NDS/NBS		DIOXIN MONITORING PROGRAM										
			1984-86	1988- 1990		19 91		19 92		19 93		19 94		19 95	
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
ANDROSCOGGIN R															
Gilead	rainbow trout													1.2	2.4-2.9
	bass													0.9	3.8-4.1
	sucker	w	1.8f/6.5w											1.7	6.1-6.7
Rumford	bass	f				1.4	2.3-2.8	0.6	1.0-1.2	2.9	4.5-5.4	3.8	5.7-6.2	2.2	3.5-4.1
	sucker	w						3.0	7.4-8.0	5.8	3.6-14.6	4.0	1.4-11.9		
Riley	sucker	w	2.1f/13w												
Jay	bass	f		17.6	4.0-29.1			1.2	1.9-2.3	1.4	1.8-2.2	1.6	2.2-2.8		
	sucker	w						5.4	2.9-13.9	4.5	0.9-11.8	4.7	1.5-12.3	2.3	6.9-7.6
Livermore Falls	bass	f				2.4	3.1-3.3	1.1	1.4-1.5	1.4	1.6-1.8	1.4	1.6-2.3	0.5	0.8-1.3
	sucker	w						3.8	7.4-8.0	3.6	6.8-7.3	2.2	4.8-5.3		
N Turner	sucker	w	6.2f/30w												
Turner-GIP	bass	f	3.7f/24w												
	sucker	w	8.3f/29w												
	bullhead	w	.8f/29.6w												
Auburn-GIP	bass sm	f						1.7	2.6-2.8	1.2	1.8-1.9	1.3	2.0-2.7		
	bass lm	f						1.1	1.6-1.8						
	sucker	w						5.6	4.3-15.4	3.7	9.0-9.8	1.6	4.4-5.4	1.4	3.8-5.0
	bullhead	w								2.1	3.0-3.3	1.3	2.3-2.8		
Lisbon Falls	trout	f		5.3	6.5-6.9										
	bass	f		4.5	5.5-5.8			0.7	1.0	1.2	1.7-1.8	0.6	0.8-1.7	0.9	1.4-2.4
	sucker	w	5.1f/12w					3.4	8.1-8.7	2.7	6.1-6.6	2.4	5.8-6.2		
Brunswick	sucker	w	19.0												
	carp	f	11.0												
BEARCE LAKE															
Baring	pickerel	f	<0.1												
BRAVE BOAT HARBOR															
Kittery	lobster	m										<0.1	<0.1-1.2		
	lobster	t										1.3	9.7-11.5	1.6	6.7-9.9
BROOKLYN	lobster	m												0.8	4.9-8.2
	lobster	t													

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86	DEP DIOXIN MONITORING PROGRAM 1988-1990		1991		1992		1993		1994		1995	
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE
JONES CREEK															
Scarborough	clam	m						<0.1	0.02-0.3						
KENNEBEC R															
Madison	trout	f												<0.1	0.1-0.7
	bass	f						<0.1	0.02-0.1						
	sucker	w						0.1	0.3					0.1	0.3-1.0
Fairfield	trout	f		6.2	6.9-8.0			1.4	1.6-1.8	1.4	1.6-1.9	2.2	2.5-3.8	1.6	1.7-2.5
	bass	f				1.4	1.6-1.7	0.6	0.6-0.7	1.5	1.7-2.0	0.9	1.1-1.8		
	sucker	w	6.4	10.3	6.8-18.1			2.0	3.1-3.3	1.6	2.2-2.6	2.2	2.9-3.8		
Sidney	bass	f	20.3w			1.0	1.4-2.4	0.4	0.6-1.0	0.6	0.8-1.4	0.3	0.4-1.3		
	sucker	w	.2f/11.4w					2.7	4.4-4.8	1.5	2.5-2.7	2.3	3.0-4.0	1.2	1.7-2.5
Augusta	trout	f		2.2	2.9-4.9			1.9	2.5-4.3					1.0	1.3-3.5
	bass	f						0.4	0.6-1.0	0.6	0.9-1.5	1.0	1.3-3.7		
	sucker	w		5.0	7.3-8.4			1.5	2.6-2.8	1.9	3.3-3.6	2.3	4.0-5.8		
Hallowell	smelt	c						0.2	0.5-0.8						
Richmond	eel	f								0.6	0.8-1.4				
Phippsburg	clam	m						0.3	0.6-0.9						
	lobster	m								0.2	0.3-1.2	<0.1	<0.1-1.6		
	lobster	t								7.9	7.5-27.6	6.5	3.4-26.6	4.6	13.5-17.1
MACHIAS BAY															
Machias	lobster	m										<0.1	<0.1-0.6		
	lobster	t										0.7	6.1-7.4		
MESSALONSKEE LAKE															
Belgrade	bass					<0.09	0.04-0.3								
NARRAGUAGUS R															
Cherryfield	fallfish	w	<1.0												
NORTH POND															
Chesterfield	sucker	w	0.37												
	pickerel	f	<0.1												

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA	DEP												
			NDS/NBS	DIOXIN MONITORING PROGRAM												
			1984-86	1988- 1990		19 91		19 92		19 93		19 94		19 95		
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	
PENOBSCOT R																
E Br Grindstone	bass	f		<0.1	0.09-0.2									<0.1	0.1-0.7	
	sucker	w		<0.4	0.02-0.6									<0.1	0.1-0.6	
E Millinocket	bass	f		<0.2	0.4-0.8											
	sucker	w		0.7	3.6-4.2											
N Lincoln	bass	f		<0.4	0.2-0.8											
	sucker	w		<0.5-20.	2.0-41.6											
S Lincoln	bass	f	5.0	1.7	2.3-2.7	0.9	1.2-1.3	0.7	1.0-1.2	1.2	1.6-1.8	0.4	0.4-1.7	0.5	0.7-1.3	
	sucker	w		37.0	6.4-67.2			3.3	6.8	1.7	3.5-3.6	2.2	5.8-6.1			
Passadumkeag	bass	f		1.8	2.9											
	sucker	w		2.8	7.6-7.7											
Milford	bass	f		0.9	1.4-1.7			0.3	0.4-0.5							
	sucker	w		9.7	9.9-20.1			2.2	4.6							
Veazie	bass	f	4.6w	1.9	2.4-2.6	1.2	1.5-1.7	0.4	0.6	0.6	0.8-1.0	0.2	0.2-1.3	0.3	0.4-1.9	
	sucker	w	2.6f/7.6w	5.9	9.8-9.9	2.5	4.9-5.0	2.2	4.8-4.9	1.1	2.7-3.0	0.6	1.6-2.8	0.5	1.4-2.5	
Bangor	eel	w								1.0	1.1-1.2					
Bucksport	clam	m						0.1	0.8-0.9							
Stockton Sprin	lobster	m								0.1	0.3-1.1	<0.1	0.1-1.0			
	lobster	t								4.0	28.0	2.3	8.1-27.9	1.3	7.2-14.6	
OWLS HEAD	mussel	m	<0.8													
PISCATAQUIS R																
Sangerville	bass	f				<0.2	0.03-0.3									
	trout	f				<0.4	0.03-0.4									
	sucker	w				0.26	0.6-0.7									
Howland	bass	f		<0.2	0.02-0.6											
PRESUMPSCOT R																
Windham	bass	f								<0.1	<0.1-0.3	<0.1	<0.1-1.1			
	sucker	w								0.3	0.7-0.8	0.2	1.4-2.4	0.3	2.4-7.7	
Westbrook	bass	f		1.8	2.4-4.5	0.2	0.2-0.4	0.1	0.2-0.4	<0.2	0.1-0.5	0.2	0.3-1.2			
	pickerel	f		<2.6	0.06-5.9											
	w perch	f		1.2	2.5-3.1	0.4	0.9-1.0									
	sucker	w	5.2	5.1	8.2-9.6	0.6	1.6-1.7	0.3	0.8-0.9	1.1	1.8-2.3	0.9	2.1-3.7	0.8	1.6-2.6	
Falmouth	clam	m						<0.1	0.2-0.4							
Portland	lobster	m								<0.1	0.1-0.8	<0.1	0.2-1.0			
	lobster	t								3.4	8.5-18.7	2.5	7.2-21.3	2.2	9.5-12.8	

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA	DEP												
			NDS/NBS	DIOXIN MONITORING PROGRAM												
			1984-86	1988- 1990		19 91		19 92		19 93		19 94		19 95		
			TCDD	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	TCDD	DTE	
ST CROIX R																
Woodland	bass	f		0.3	0.5-1.0	<0.1	0.04-0.3									
Calais	sucker	w	<0.7	0.6	1.0-1.1											
ST JOHN R																
Frenchville	sucker	w										0.1	0.2-1.0			
Madawaska	y perch	f		<0.5	0.08-0.8											
	brook trout	f										<0.3	<0.1-2.3			
	sucker	w										<0.1	0.2-0.8			
SACO R																
Dayton	sucker	w	<0.3													
SACO BAY																
Scarborough	lobster	m								<0.1	0.1-0.8	<0.1	<0.1-0.8			
	lobster	t								2.0	1.3-14.6	1.3	9.7-12.0			
SALMON FALLS R																
Acton	bass lm													<0.1	<0.1-0.7	
	sucker															
S Berwick	bass sm	f		0.4	0.5-0.6					0.2	0.2-0.9	0.5	0.7-3.3	0.4	0.4-4.0	
	pickerel	f		0.2	0.3											
	sucker	w		1.5	2.1-2.2			2.4	3.4-3.6	1.9	3.6-3.8	2.1	4.7-6.1			
SANDY P																
	bass	f	<1.0													
SEBAGO L																
Naples	bass	w	<0.6													

TABLE 2. (cont.)

WATER/STATIO	SPECIES	TYPE	EPA NDS/NBS 1984-86 TCDD	DEP DIOXIN MONITORING PROGRAM 1988-1990 TCDD	1988-1990 DTE	1991 TCDD	1991 DTE	1992 TCDD	1992 DTE	1993 TCDD	1993 DTE	1994 TCDD	1994 DTE	1995 TCDD	1995 DTE
SEBASTICOOK R															
E Br Corinna	bass lm													0.1	0.2-1.1
	sucker														
Newport	bass sm	f						0.1	0.3-0.4						
	bass lm	f	<0.2					<0.2	0.2-0.4					0.3	1.1-2.0
	w perch	f		1.0	1.6-2.1										
W Br Harmony	bass													<0.1	0.1-0.8
	sucker														
W Br Palmyra	bass	f		1.2	1.4-1.8			0.4	0.5-0.6	0.9	1.2-1.6	0.4	0.4-1.3	0.8	1.7-2.2
	pickerel	f	<0.1					0.2	0.2						
	sucker	w	1.57	3.3	4.3-4.6			1.1	1.4-1.6	1.0	2.6-2.7	1.2	4.0-4.3		
WEBBER POND															
Vassalboro	bass	f				<0.08	0.04-0.4								

f=fillet
m=meat
t=tomalley
w=whole

DTE= dioxin toxic equivalents (range at nd=0 and nd=mdl) using EPA 1989 toxic equivalency factors (TEF).

TCDD concentrations in suckers were similar to those from the EPA study, which is surprising given the reductions made in Maine mills and at the Crown Vantage mill in Berlin, New Hampshire since 1990.

Rumford Ten smallmouth bass were collected from the river from just below the discharge from Boise Cascade's bleached kraft pulp and paper mill in Rumford downstream about 4 miles to Dixfield (Appendix 7). Concentrations of both TCDD and DTE_0 in bass were above both the MAC and the FCAT (Table 2). TCDD and DTE_h concentrations were slightly lower than in 1994, but differences were not statistically significant. Concentrations of TCDD and DTE_h were higher than those in bass and rainbow trout upstream at Gilead, but since there was only one sample of each of those species, statistical comparisons could not be made. No sludge data have been reported since 1989. Concentrations of TCDD and TCDF were all reported at <10 ppq in 1995, which is a higher reporting level than used since 1989, making it impossible to determine how concentrations in effluent compare to previous years (Appendix 4).

Jay Ten white suckers were collected near Bean Island in the Jay Impoundment, which is about 20 miles below Boise Cascade and in the impoundment into which International Paper Company's bleached kraft mill discharges about 1 mile downstream (Appendix 7). TCDD and DTE_0 concentrations in the suckers were above the MAC, while TCDD was below and DTE_0 above the FCAT when normalized to skinless fillets. Concentrations of both TCDD and DTE_h were lower than in all previous years (Table 2), but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Concentrations of both were slightly higher than at Gilead and Rumford.

Livermore Falls Ten smallmouth bass were captured in the Otis Impoundment, approximately 1.5-3 miles below the discharge from International Paper Company's Jay mill (Appendix 7). Concentrations of TCDD, DTE_0 and DTE_d in the bass were above the MAC but below the FCAT (Table 2). Concentrations of both TCDD and DTE_h were lower than those in 1994, but the differences were not statistically significant. Both were also slightly lower than at the upstream stations. Concentrations of TCDD and TCDF in sludge (Appendix 3) and effluent (Appendix 4) were below variable detection limits or lower than in 1994, which is consistent with lower levels in the fish.

Auburn-GIP Ten white suckers were collected in Gulf Island Pond (GIP) near the deep hole at Seagull Island, about 25-30 miles below International Paper Company (Appendix 7). Concentrations of TCDD, DTE_0 and DTE_d in the suckers were above the MAC but slightly below the FCAT when normalized as fillets (Table 2). Both TCDD and DTE_h were slightly lower than in 1994, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Concentrations were the lowest of all stations sampled for suckers in 1995.

Lisbon Falls Ten smallmouth bass were captured in the Pejepscot Impoundment, about 45-50 miles below International Paper Company (Appendix 7). Concentrations of TCDD, DTE_0 and DTE_d in the bass were above the MAC (Table 2). DTE_0 were slightly below and DTE_d well above the FCAT. TCDD was slightly higher and DTE_h was statistically higher than in 1994. Both TCDD and DTE were the lowest of all the Androscoggin River sites. The lack of sufficient effluent and sludge data from Boise and International Paper make evaluation of the increase in concentrations in bass impossible to explain. Nevertheless, concentrations of TCDD and DTE in bass immediately below both mills did not increase.

Brave Boat Harbor

Kittery Ten lobsters were collected from a lobster fisherman at Brave Boat Harbor in Kittery. This site was added as a reference site for southern Maine in 1994. Concentrations in the hepatopancreas or "tomalley" of TCDD and DTE_h were slightly higher and slightly lower respectively than in 1994 (Table 2). The source of dioxin to these lobsters is unknown. These concentrations may represent background in Southern Maine as affected by local sources and/or long-range transport and deposition.

Eggemoggin Reach

Brooklyn Ten lobsters were collected from a lobster fisherman from Eggemoggin Reach in Brooklyn. This site was added as a reference site for downeast Maine in 1995 as a replacement for Machias Bay that was sampled in 1994 but was unsuccessfully sampled in 1995. Concentrations in the hepatopancreas or "tomalley" of TCDD and DTE_h were similar to those from Machias Bay in 1994 and lower than those from Brave Boat Harbor in 1995 (Table 2). The source of dioxin to these lobsters is unknown. These concentrations may represent background in eastern Maine as affected by local sources and/or long- range transport and deposition and are in the range that prompted the Bureau of Health to issue a consumption advisory on 2 February 1994 regarding tomalley for the entire coast (Appendix 1)

Kennebec River

Madison

Three brown trout and ten white suckers (Appendix 7) were collected from the river upstream of the dams in Madison. This station was selected as a reference station for the Kennebec River since there are no known point sources of dioxin upstream of this station. Concentrations of TCDD and DTE_0 were below the MAC in both species, while concentrations of DTE_d were about half way between the MAC and the FCAT (Table 2). Concentrations of both TCDD and DTE_h in suckers were similar to those from 1992. The small amount of DTE measured in these fish is thought to represent long-range transport and atmospheric deposition from remote sources.

Fairfield Ten brown trout (Appendix 7) were collected from the river between the Shawmut Dam and the I-95 bridge, about 7-8 miles below SD Warren's bleached kraft pulp and paper mill in Skowhegan. Concentrations of TCDD and DTE_0 in the brown trout were above the MAC and the FCAT (Table 2). Both TCDD and DTE_h were statistically lower than in 1994 and were more similar to 1993. Concentrations were statistically greater than those from the reference station at Madison. Concentrations of both in sludge (Appendix 3) from the SD Warren mill were much reduced from those of previous years.

Sidney Ten white suckers (Appendix 7) were collected from the river within one mile of the Sidney boat landing, about 25 miles below the SD Warren mill in Skowhegan and about 9-10 miles below the discharges from the Scott Paper mill in Winslow and the Kennebec Sanitary Treatment District's discharge in Waterville. Concentrations of TCDD, DTE_0 and DTE_d in the suckers were above the MAC but below the FCAT when normalized as fillets (Table 2). Concentrations of both TCDD and DTE_h were the lowest yet at this site, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Concentrations of both were much higher than those at the reference site at Madison. Since 1994 there has been a decrease in discharge of dioxin from the SD Warren mill which may result in significant decreases in fish from this reach (Appendix 3).

Augusta Ten brown trout (Appendix 7) were collected just below the Edwards Dam in Augusta at the mouth of Bond Brook. In addition to the upstream sources at the Sidney site, until closing in early 1995, Statler Tissue Company discharged effluent just above the dam. Concentrations of TCDD, DTE_0 and DTE_d in the trout were above the MAC and DTE_d were above the FCAT (Table 2). Concentrations of TCDD and DTE_h in brown trout were lower than when last collected at this site in 1992, but the TCDD difference was not statistically significant. No statistical analysis was conducted for DTE_h in brown trout, since in 1992 all congeners were not measured but only estimated from 1993 results from Fairfield. In 1995 concentrations of both TCDD and DTE_h were statistically higher in brown trout form this site than in brown trout from the reference station at Madison.

Phippsburg Ten lobsters were collected from a lobster fisherman fishing the estuary near Cox Head, approximately 45 miles below Augusta. This site is downstream of all the sources on the Androscoggin and Kennebec Rivers. Concentrations of TCDD and DTE_h in the hepatopancreas or "tomalley" were lower than in 1994 (Table 2), but the differences were not statistically significant. There was a slight trend toward decreasing concentrations beginning in 1993. This site had the highest TCDD concentration of all sites monitored again in 1995. Concentrations of both TCDD and DTE_h were statistically higher than those at the most contaminated reference station, Brave Boat Harbor. Concentrations remain within the range that prompted the Bureau of Health to issue a consumption advisory on 2 February 1994 regarding tomalley for the entire coast (Appendix 1).

Penobscot River

Grindstone

Ten smallmouth bass and ten white suckers (Appendix 7) were captured from just above Grindstone Falls. This station on the East Branch of the Penobscot River was selected as a reference for the Penobscot River since there are no known point sources of dioxin upstream. Concentrations of TCDD and DTE_0 were below the MAC in both species while concentrations of DTE_d were slightly greater than the MAC. Concentrations of both TCDD and DTE_h were similar to those measured in both species in 1988 (Table 2). The small amount of DTE measured in these fish is thought to represent long-range transport and atmospheric deposition from remote sources.

South Lincoln Ten smallmouth bass (Appendix 7) were collected near the boat ramp in South Lincoln, about 3-4 miles below Lincoln Pulp and Paper Company's bleached kraft mill in Lincoln. Concentrations of TCDD, DTE_0 and DTE_d in the bass were above the MAC but below the FCAT (Table 2). Concentrations of both TCDD and DTE_h were similar to those in 1994 and statistically greater than the reference station at Grindstone. Concentrations in both species were slightly higher than at Veazie, the only other site on the river. Recent effluent data from Lincoln Pulp and Paper Co.(Appendix 4) show a slight reduction in amounts of dioxin discharged since 1994.

Veazie Ten smallmouth bass and seven white suckers (Appendix 7) were collected from the Veazie Impoundment about 7-8 miles below James River's bleached kraft mill in Old Town. Concentrations of TCDD, DTE_0 and DTE_d in bass were above the MAC but below the FCAT (Table 2). Concentrations of both TCDD and DTE_h were slightly higher than in 1994 and statistically higher than at the reference station at Grindstone. Concentrations of TCDD in suckers were just below and DTE were above the MAC, but both were below the FCAT when normalized as fillets. Concentrations of both were similar to those in 1994 and much greater than at the reference station at Grindstone, although the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. The concentration of TCDD in one sludge sample reported by James River for 1995 was much lower than in samples collected in 1989 (Appendix 3) while concentrations of TCDD in effluent from 1995 samples were similar to those of 1994 (Appendix 4).

Stockton Springs Ten lobsters were collected from a lobsterman fishing near Verona Island, about 40 miles below James River's mill. Concentrations of TCDD and DTE_h in tomalley were lower than in 1994 (Table 2), but the difference was not statistically significant. There was a slight trend toward decreasing concentrations beginning in 1993. Concentrations of both TCDD and DTE_h at this site were the lowest of all the test sites monitored. The concentration of TCDD was statistically greater while DTE_h were slightly (but not statistically) greater than those at the Downeast Maine reference station at Eggemoggin Reach. Concentrations remain within the range that prompted the Bureau of Health to issue a consumption advisory on 2 February 1994 regarding tomalley for the entire coast (Appendix 1).

Presumpscot River

Windham Ten white suckers (Appendix 7) were collected below North Gorham Pond. This site has been used as a reference station since 1993 since there are no known point sources of dioxin upstream. Concentrations of TCDD in the suckers were below while DTE_0 and DTE_d were above the MAC. Both TCDD and DTE_0 were below but DTE_d exceeded the FCAT when normalized as filets (Table 2). TCDD concentrations were similar but DTE_h were much higher than those of previous years. These concentrations may represent background from long range transport and atmospheric deposition from remote sources. However, concentrations from this site have been consistently higher for all years than any other reference station in the program. These results suggest that there are other local sources of dioxin which have not yet been discovered. Potential sources are air emissions from two nearby waste to energy incinerators, Regional Waste Systems in Portland and Maine Energy Recovery Corporation in Biddeford, although preliminary discussion with DEP's Bureau of Air Quality Control does not indicate that prevailing wind directions would implicate these sources.

Westbrook Ten white suckers (Appendix 7) were collected from the river near the US Route 302 bridge about 1.5 miles downstream of the discharge from SD Warren's bleached kraft pulp and paper mill. Concentrations of TCDD, DTE_0 and DTE_d in the suckers were above the MAC but below the FCAT when normalized as fillets (Table 2). Concentrations of both TCDD and DTE_h were slightly lower than in 1994, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Concentrations of TCDD was greater but DTE_h were lower than the reference site upstream, suggesting a different source of dioxins and furans to each river reach. Concentrations of TCDD in sludge and effluent from the mill continue to be relatively similar to those in 1994 (Appendices 3 and 4).

Portland Ten lobsters were collected from a lobster fisherman fishing at the mouth of the estuary off East End Beach about 10-11 miles below the SD Warren discharge. Concentrations of TCDD and DTE_h in tomalley were lower than in 1994 (Table 2), but the difference was not statistically significant. There was a slight trend toward decreasing concentrations beginning in 1993. Concentrations of both TCDD and DTE_h were statistically higher than those at the most contaminated reference station, Brave Boat Harbor. Concentrations remain within the range that prompted the Bureau of Health to issue a consumption advisory on 2 February 1994 regarding tomalley for the entire coast (Appendix 1).

Salmon Falls River

Acton Ten largemouth bass (Appendix 7) were collected from Great East Lake and Horn Pond. This site was selected as a reference station for the Salmon Falls River since it is at the headwaters and there are no known point sources of dioxin upstream. Concentrations of TCDD and DTE_0 in the bass were below the MAC while DTE_d were above the MAC, but all were well below the FCAT (Table 2). These concentrations were similar to those at all other reference stations except the Presumpscot River at Windham. The small amount of DTE measured in these fish is thought to represent long-range transport and atmospheric deposition from remote sources.

South Berwick Eight smallmouth bass were collected from the Rollinsford Impoundment about 2 miles below the discharge from the Berwick Sewer District in Berwick, whose discharge is 85% effluent from Prime Tanning. This is the first year in which an acceptable number of bass have been captured at this station. Concentrations of TCDD, DTE_0 and DTE_d in the bass were above the MAC, and concentrations of DTE_d exceeded the FCAT. Concentrations of both TCDD and DTE_h are similar to those of 1994, although in 1994 only two bass were sampled. Concentrations of both were much greater than those at the reference station at Great East Lake and Horn Pond, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Nevertheless, these results document a local source of dioxin to this reach of the river. There are no new effluent or sludge data to aid interpretation of these results.

Sebasticook River

East Branch at Corinna Ten largemouth bass (Appendix 7) were collected from the upper end of Corundel Pond, an impoundment of the river just upstream of the Eastland Woolen Mill dam and Corinna Sewer District discharge in Corinna. This site was selected to serve as a reference for the East Branch of the Sebasticook River since there are no known point sources of dioxin upstream, although there were municipal and industrial discharges from the upstream town of Dexter until 1988. Concentrations of TCDD in the bass were below and DTE_0 (slightly) and DTE_d above the MAC, but all were well below the FCAT (Table 2). These concentrations were generally similar to those at all other reference stations except the Presumpscot River at Windham. The small amount of DTE measured in these fish is thought to represent some input from Dexter or long-range transport and atmospheric deposition from remote sources.

East Branch at Newport Eight largemouth bass (Appendix 7) were collected from just above the County Road Bridge, a popular fish spot, at the inlet to Sebasticook Lake. This station is about 1-2 miles below the Corinna Sewer District discharge, 80% of which is from the Eastland Woolen Mill. Concentrations of TCDD, DTE_0 and DTE_d in the bass exceeded the MAC and concentrations of DTE_d exceeded the FCAT. Concentrations of TCDD are higher than in fish collected at this site from the EPA study in 1985 and both TCDD and DTE_h are higher than in fish collected from Sebasticook Lake in 1992, although lower than in white perch in 1990. In 1995 concentrations were also higher than at the reference station in Corundel Pond, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Nevertheless, these results document a local source of dioxin to this reach of the river. Measurable amounts of dioxin and furan have been found in sludge from the Corinna Sewer District for a number of years (Appendix 3).

West Branch at Hartland Ten smallmouth bass (Appendix 7) were collected from Great Moose Lake in Hartland. This site was selected to serve as a reference station for the West Branch of the Sebasticook River since there are no known point sources of dioxin upstream. Concentrations of TCDD and DTE_0 in the bass were below while DTE_d were above the MAC, but all were well below the FCAT (Table 2). Concentrations of TCDD and DTE_h were generally similar to those at all other reference stations except the Presumpscot River at Windham. The small amount of DTE measured in these fish is thought to represent long-range transport and atmospheric deposition from remote sources.

West Branch at Palmyra Ten smallmouth bass were collected near the US Route 2 bridge about 3-4 miles below the discharge from the Town of Hartland, whose effluent is about 85% effluent from Irving Tanning Company. Concentrations of TCDD and DTE_0 and DTE_d in the bass were above the MAC and DTE_0 and DTE_d exceeded the FCAT (Table 2). Concentrations of TCDD and DTE_h were greater than in 1994 and similar to those in 1993, but the specified sample size (n=2) was insufficient to allow a meaningful statistical analysis. Concentrations were higher at this station than at the reference station at Great Moose Lake. These results document a local source of dioxin to this reach of the river. There are no new sludge data to aid interpretation of current levels of discharge.

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APPENDIX 1

MAINE BUREAU OF HEALTH

FISH CONSUMPTION ADVISORY, 10 FEBRUARY 1992

LOBSTER TOMALLEY CONSUMPTION ADVISORY, 2 FEBRUARY 1994

HUMAN SERVICES News

Office of Public Affairs & Communications
Maine Department of Human Services
State House Station 11
Augusta, Maine 04333
Tel. 289-3707

JOINT STATEMENT, FEBRUARY 10, 1992:
Department of Environmental Protection
Department of Human Services
Department of Inland Fish and Wildlife

SUBJECT: REDUCED DIOXIN LEVELS PROMPT REVISED FISH ADVISORY

CONTACT: Robert Frakes
Department of Human Services
Bureau of Health
Telephone: 289-5378

Dean Marriott, Commissioner
Department of Environmental Protection
Telephone: 289-2812

AUGUSTA - Recent tests by the Department of Environmental Protection (DEP) showed reductions in levels of dioxin in fish taken from Maine's major rivers. The results are similar to those reported by the paper industry in August 1991.

Officials say the changes reflect reduced discharges of the chemical from pulp and paper mills across the state. The improvements have prompted a revision of a fish consumption advisory issued in March 1990.

The new language raises recommended consumption limits for most segments of the population. Previous advisories that pregnant women and nursing mothers not eat fish caught in the Presumpscot River below Westbrook and the West Branch of the Sebasticook below Hartland have also been lifted.

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According to State Toxicologist Dr. Robert Frakes, data from Maine's dioxin Monitoring Program supports revising the warnings to be published in the State Open Water Fishing Regulations. However, some cautions remain in place.

"Women of childbearing age still should not eat any fish from the Androscoggin River, the Kennebec River below Skowhegan and the Penobscot River below Lincoln. Furthermore, the general public should not eat more than one fish meal per month from the Androscoggin or more than two fish meals per month from those sections of the Kennebec and Penobscot".

A "fish meal" is considered to be one 8-ounce portion.

Dioxion levels in fish have been monitored under the DEP administered program since 1988. Because even very low levels of TCDD dioxin have been linked to increased cancer rates and reproductive problems in laboratory animals, health advisories were issued in 1985, 1987 and 1990.

Commenting on the latest revision to the advisories, DEP Commissioner Dean Marriott emphasized the progress that has been made in a relatively short period of time.

"Industry has been working to reduce the formation of dioxin by actually changing the manufactoring process. The recent data would seem to indicate that these efforts are showing positive results."

A full report of the 1991 Dioxin Monitoring Program is now being prepared and will be presented to the legislature's Joint Standing Committee on Energy and Natural Resources.

HUMAN SERVICES News

Maine Department of Human Services
State House Station 11
Augusta, Maine 04333
Tel. 289-3707

FEB 0 2 1994

JOINT HEALTH ADVISORY

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Dean Marriott, Commissioner, 287-2812
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AUGUSTA - Preliminary analysis of data from tests conducted on lobsters taken off the coast of Maine indicate unacceptably high concentrations of dioxin in lobster tomalley, but not in lobster meat. These results have prompted state officials to issue a health advisory against the consumption (eating) of tomalley by pregnant women, nursing mothers and women of child bearing age. This recommendation is based on the principle that developing children are considered to be at highest risk for possible injury resulting from exposure to dioxin.

Others should limit their consumption of tomalley, as dioxin found in tomalley will contribute to the overall intake of this chemical, and to cancer risk generally.

The tomalley is the soft, green substance found in the body cavity of the lobster. It functions as the liver and pancreas of the lobster serving to filter, metabolize and detoxify all substances that are

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consumed by the lobster. As a result of this protective function, the tomalley concentrates certain chemicals which cannot be eliminated or detoxified.

Dioxin is a substance which has been linked to cancer and adverse birth outcomes in animals. Since 1988, Maine has been sampling fish for dioxin, but lobsters had not been included until the 1993 round of tests. This round of tests has revealed unexpectedly high concentrations of dioxin in the tomalley (13.4 - 30.7 ppt), but not in the meat.

Maine's advisory is similar to one issued by the Massachusetts Department of Public Health, and to cautionary statements issued by the seafood marketing industry.

APPENDIX 2

DIOXIN AND FURAN CONCENTRATIONS IN FISH AND SHELLFISH

1995

CODES

STATIONS

AGL	ANDROSCOGGIN RIVER AT GILEAD
ARF	ANDROSCOGGIN RIVER AT RUMFORD
AJY	ANDROSCOGGIN RIVER AT JAY
ALV	ANDROSCOGGIN RIVER AT LIVERMORE FALLS
AGI	ANDROSCOGGIN RIVER AT GULF ISLAND POND, AUBURN
ALS	ANDROSCOGGIN RIVER AT LISBON FALLS
BBK	BRAVE BOAT HARBOR AT KITTERY
ERB	EGGEMOGGIN REACH AT BROOKLYN
KMD	KENNEBEC RIVER AT MADISON
KFF	KENNEBEC RIVER AT SHAWMUT, FAIRFIELD
KSD	KENNEBEC RIVER AT SIDNEY
KAG	KENNEBEC RIVER AT AUGUSTA
KRP	KENNEBEC RIVER AT PHIPPSBURG
PBG	PENOBSCOT RIVER AT GRINDSTONE
PBL	PENOBSCOT RIVER AT SOUTH LINCOLN
PBV	PENOBSCOT RIVER AT VEAZIE
PBS	PENOBSCOT RIVER AT STOCKTON SPRINGS
PWD	PRESUMPSCOT RIVER AT WINDHAM
PWB	PRESUMPSCOT RIVER AT WESTBROOK
PRP	PRESUMPSCOT RIVER AT PORTLAND
SFA	SALMON FALLS RIVER AT ACTON
SFS	SALMON FALLS RIVER AT SOUTH BERWICK
SJF	ST JOHN RIVER AT FRENCHVILLE
SJM	ST JOHN RIVER AT MADAWASKA
SEC	SEBASTICOOK RIVER E BR AT CORINNA
SEN	SEBASTICOOK RIVER E BR AT NEWPORT
SWH	SEBASTICOOK RIVER W BR AT HARTLAND
SWP	SEBASTICOOK RIVER W BR AT PALMYRA

SPECIES

BNT	BROWN TROUT
BUL	BROWN BULHEAD
LMB	LARGEMOUTH BASS
LOB	LOBSTER
SMB	SMALLMOUTH BASS
WHS	WHITE SUCKER

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

FISH					
Field ID	AGL-RBT-COMP-1	AGL-SMB-COMP-1	AGL-WHS-COMP-01	AGL-WHS-COMP-02	ARF-SMB-COMP-01
Extract ID	35144.0	35145.0	34753.0	34754.0	34740.0
MS File	B01V518.RPT	B01V519.RPT	A24V52.RPT	A24V53.RPT	A23V75.RPT
Isomers					
2378TCDF	11.7	16.5	23.9	24.3	4.0
2378TCDD	1.2	0.9	2.0	1.4	0.8
12378PECDF	1.5	4.9	2.6	2.4	0.7
23478PECDF	U(.25)	0.5	3.6	2.9	1.1
12378PECDD	U(.275 EMPC)	0.3	0.3	0.3	U(.249)
123478HXCDF	U(.25)	4.5	0.7	U(.718 EMPC)	U(.249)
123678HXCDF	U(.737 EMPC)	U(2.03 EMPC)	U(3.29 EMPC)	U(4.9 EMPC)	U(1.13 EMPC)
234678HXCDF	U(.25)	0.6	U(.249)	U(.246)	U(.249)
123789HXCDF	U(.25)	U(.943 EMPC)	U(.249)	U(.246)	U(.249)
123478HXCDD	U(.25)	U(.26)	U(.249)	U(.246)	U(.249)
123678HXCDD	U(.25)	0.4	0.5	0.5	U(.249)
123789HXCDD	U(.25)	U(.26)	U(.249)	U(.246)	U(.249)
1234678HPCDF	U(.818 EMPC)	4.8	U(5.58 EMPC)	U(12.6 EMPC)	U(2.22 EMPC)
1234789HPCDF	U(.25)	1.9	U(.249)	U(.246)	U(.249)
1234678HPCDD	U(.25)	1.0	0.5	0.7	U(.249)
12346789OCDF	U(.499)	5.3	U(.497)	U(.491)	U(.498)
12346789OCDD	U(.626 EMPC)	2.7	1.5	2.1	1.1
TCDF	13.0	19.1	27.3	28.3	8.1
TCDD	1.2	0.9	2.3	1.8	0.8
PECDF	4.2	10.5	7.1	6.5	4.7
PECDD	U(.25)	0.3	0.3	0.3	U(.249)
HXCDF	U(.25)	9.0	1.1	0.6	U(.249)
HXCDD	0.3	1.1	0.6	0.5	U(.249)
HPCDF	U(.25)	8.1	U(.249)	U(.246)	U(.249)
HPCDD	U(.25)	1.7	0.7	1.2	U(.249)
% Lipid	3.8	5.4	9.2	8.3	2.2
DTE o	2.4	3.8	6.5	5.6	1.8
DTE d	2.9	4.1	7.0	6.4	2.2

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

ARF-SMB-COMP-02	ARF-SMB-COMP-03	ARF-SMB-COMP-04	ARF-SMB-COMP-05	AJY-WHS-COMP-1	AJY-WHS-COMP-2
34741.0	34742.0	34907.0	34908.0	34968.0	34969.0
A23V76.RPT	A23V77.RPT	A25V15.RPT	A25V43.RPT	A25V417.RPT	A25V418.RPT
3.2	3.9	7.0	8.1	25.4	26.3
1.2	1.2	2.8	5.0	2.2	2.4
0.8	0.8	1.1	U(1.68 EMPC)	2.5	1.6
1.2	1.2	1.2	3.0	4.4	2.7
U(.249)	U(.25)	0.2	U(.53 EMPC)	0.4	0.4
U(.249)	U(.25)	U(.235)	U(.562 EMPC)	U(1.46 EMPC)	U(.477)
U(1.47 EMPC)	U(2.05 EMPC)	U(1.05 EMPC)	U(5.33 EMPC)	U(3.24 EMPC)	U(3.75 EMPC)
U(.249)	U(.336 EMPC)	U(.235)	U(.234)	U(.423 EMPC)	U(.51 EMPC)
U(.249)	U(.25)	U(.235)	U(.234)	U(.284 EMPC)	U(.596)
U(.249)	U(.25)	U(.235)	U(.234)	U(.249)	U(.249)
U(.249)	U(.25)	U(.235)	U(.234)	0.5	0.4
U(.249)	U(.25)	U(.235)	U(.234)	U(.249)	U(.249)
U(2.92 EMPC)	U(3.15 EMPC)	U(1.21 EMPC)	U(4.96 EMPC)	U(.249)	U(4.66 EMPC)
U(.249)	U(.25)	U(.235)	U(.234)	U(.249)	U(.249)
U(.249)	U(.25)	U(.235)	0.2	0.5	0.5
U(.497)	U(.499)	U(.47)	U(.467)	U(.498)	U(.498)
1.1	2.0	1.1	U(1.46 EMPC)	1.1	2.0
3.8	4.5	8.4	12.8	32.9	30.4
1.2	1.2	2.9	5.1	2.7	2.8
2.2	2.3	2.9	6.4	11.8	6.6
U(.249)	U(.25)	0.2	U(.234)	0.4	0.4
U(.249)	0.3	0.3	1.1	0.8	U(.477)
U(.249)	U(.25)	U(.235)	U(.234)	0.5	0.5
U(.249)	U(.25)	U(.235)	U(.234)	U(.249)	U(.249)
U(.249)	U(.25)	U(.235)	0.2	0.5	0.5
1.6	1.8	2.6	2.9	8.0	8.7
2.1	2.2	4.2	7.3	7.3	6.7
2.6	2.8	4.5	8.4	7.9	7.3

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

ALV-SMB-COMP-01	ALV-SMB-COMP-02	ALV-SMB-COMP-03	ALV-SMB-COMP-04	ALV-SMB-COMP-05	AGI-WHS-COMP-01
34735.0	34736.0	34737.0	34738.0	34739.0	34751.0
A23V62.RPT	A23V71.RPT	A23V72.RPT	A23V73.RPT	A23V74.RPT	A24V14.RPT
0.6	1.1	2.4	0.8	0.7	16.5
0.3	0.4	0.9	0.2	0.6	1.4
U(.249)	U(.248)	0.5	U(.249)	U(.249)	1.1
U(.249)	0.5	0.7	U(.249)	U(.249)	1.1
0.3	U(.248)	U(.25)	U(.249)	U(.249)	0.3
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
U(.255 EMPC) (b)	U(2.03 EMPC)	U(1.79 EMPC)	U(1.16 EMPC)	U(1.64 EMPC)	U(6.31 EMPC)
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	0.5
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
U(.366 EMPC)	U(5.97 EMPC)	U(3.76 EMPC)	U(3.72 EMPC)	U(5.23 EMPC)	U(28.1 EMPC)
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
0.3	U(.248)	0.6	0.3	0.6	1.1
U(.499)	U(.497)	U(.499)	U(.498)	U(.498)	0.5
1.1	1.3	2.9	6.0	1.6	6.6
9.2	1.7	2.9	1.1	0.8	17.9
0.3	0.5	1.0	0.2	0.6	1.7
4.6	1.2	1.2	0.3	U(.249)	2.2
0.3	U(.248)	U(.25)	U(.249)	U(.249)	0.3
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	1.1
U(.249)	U(.248)	0.3	U(.249)	U(.249)	0.9
U(.249)	U(.248)	U(.25)	U(.249)	U(.249)	U(.247)
0.3	U(.248)	1.2	0.7	1.1	1.8
0.8	1.3	2.2	0.9	0.8	5.1
0.5	0.7	1.5	0.3	0.7	3.9
0.8	1.3	2.0	0.9	1.3	4.9

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

AGI-WHS-COMP-02	ALS-SMB-COMP-01	ALS-SMB-COMP-02	ALS-SMB-COMP-03	ALS-SMB-COMP-04	ALS-SMB-COMP-05
34752.0	34743.0	34744.0	34745.0	34901.0	35567
A24V15.RPT	A23V712.RPT	A23V713.RPT	A23V714.RPT	A24V515.RPT	E29VQ39.RPT
15.8	1.7	2.7	3.1	1.2	2.58
1.5	0.6	1.1	0.8	0.6	1.6
U(1.06 EMPC)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
1.1	0.4	0.7	0.5	0.3	0.673
U(.305 EMPC)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
U(7.72 EMPC)	U(5.88 EMPC)	U(7.87 EMPC)	U(8.19 EMPC)	U(2.12 EMPC)	U(3.53 EMPC)
U(.248)	U(.25)	U(.287 EMPC)	U(.247)	U(.244)	U(.451 EMPC)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.317 EMPC)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
0.6	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
U(36.6 EMPC)	U(22.7 EMPC)	U(20.8 EMPC)	U(28.2 EMPC)	U(2.29 EMPC)	U(.245)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
0.8	U(.25)	0.5	0.3	U(.244)	U(.245)
U(.497)	U(.5)	U(.498)	U(.493)	U(.487)	U(.49)
4.1	2.0	3.3	2.3	0.9	U(.49)
16.6	2.1	3.3	3.3	2.2	4.08
1.6	0.6	1.2	0.8	0.7	1.6
1.4	1.2	2.2	0.5	0.6	1.2
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
0.6	0.4	U(.249)	0.7	0.6	U(.245)
0.9	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
U(.248)	U(.25)	U(.249)	U(.247)	U(.244)	U(.245)
1.3	U(.25)	0.9	0.3	U(.244)	U(.245)
3.3	1.4	1.7	1.8	1.2	1.3
3.7	0.9	1.7	1.4	0.9	2.19
5.1	2.1	3.0	2.8	1.4	2.87

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

KMD-BNT-1	KMD-BNT-2	KMD-BNT-3	KMD-WHS-COMP-1	KMD-WHS-COMP-2	KFF-BNT-COMP-01
34974.0	35570	35571	34964.0	34965.0	34746.0
B01V42.RPT	E29VQ312.RPT	E29VQ313.RPT	A25V49.RPT	A25V410.RPT	A23V715.RPT
0.3	0.432	0.611	1.0	1.3	1.5
U(.0799)	0.0775	0.14	U(.112 EMPC)	0.1	1.5
U(.248)	U(.246)	U(.294 EMPC)	U(.25)	U(.248)	U(.249)
U(.248)	U(.246)	U(.271 EMPC)	U(.252 EMPC)	0.4	U(.249)
U(.248)	U(.246)	U(.279 EMPC)	U(.25)	U(.248)	U(.249)
U(.248)	U(.465)	U(.248)	U(.25)	U(.248)	U(.249)
U(.565 EMPC)	U(.737 EMPC)	U(.602 EMPC)	U(2.35 EMPC)	U(3.76 EMPC)	U(2.6 EMPC)
U(.248)	U(.441 EMPC)	U(.248)	U(.25)	U(.248)	U(.249)
U(.248)	U(.595)	U(.248)	U(.25)	U(.248)	U(.249)
U(.248)	U(.246)	U(.248)	U(.25)	U(.248)	U(.249)
U(.248)	U(.246)	0.367	U(.25)	U(.248)	U(.249)
U(.248)	U(.246)	U(.248)	U(.25)	U(.248)	U(.249)
U(.607 EMPC)	U(.246)	U(.248)	U(2.52 EMPC)	U(3.4 EMPC)	U(7.71 EMPC)
U(.248)	U(.246)	U(.248)	U(.25)	U(.248)	U(.249)
0.3	U(.246)	0.432	0.3	0.5	0.4
U(.495)	U(.493)	U(.496)	U(.499)	U(.496)	U(.499)
U(.968 EMPC)	U(.493)	0.565	1.5	0.9	2.6
0.3	0.855	1.44	2.9	2.9	2.1
U(.0799)	0.188	0.287	3.5	2.3	1.5
U(.248)	0.322	U(.248)	0.6	1.9	0.4
U(.248)	U(.246)	U(.248)	U(.25)	U(.248)	U(.249)
U(.248)	U(.46)	0.293	0.4	0.6	U(.249)
U(.248)	U(.246)	0.401	U(.25)	U(.248)	U(.249)
U(.248)	U(.246)	U(.248)	U(.25)	U(.248)	U(.249)
0.3	U(.246)	0.432	0.3	0.5	0.4
2.5	2.5	3.4	5.9	6.7	5.4
0.0	0.12	0.24	0.1	0.5	1.6
0.6	0.68	0.72	0.9	1.2	2.4

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

KFF-BNT-COMP-02	KFF-BNT-COMP-03	KFF-BNT-COMP-04	KFF-BNT-COMP-05	KSD-WHS-COMP-1	KSD-WHS-COMP-2
34747.0	34748.0	34749.0	34750.0	35568	34967.0
A23V716.RPT	A24V11.RPT	A24V12.RPT	A24V13.RPT	E29VQ310.RPT	A25V416.RPT
1.2	1.2	1.7	1.4	3.78	4.8
1.4	1.8	1.7	1.7	0.967	1.5
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.362 EMPC)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	U(.249)	U(.25)	U(.246)	U(1.21)	U(.468)
U(2.72 EMPC)	U(2.25 EMPC)	U(1.45 EMPC)	U(2.53 EMPC)	U(1.08)	U(3.65 EMPC)
U(.248)	U(.249)	U(.25)	U(.246)	U(1.06)	U(.413)
U(.248)	U(.249)	U(.25)	U(.246)	U(1.55)	U(.585)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	0.3
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(9.15 EMPC)	U(4.5 EMPC)	U(3.82 EMPC)	U(5.84 EMPC)	U(.249)	U(.25)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	0.4	0.4	0.5	0.462	0.7
U(.496)	U(.499)	U(.499)	U(.492)	U(.498)	U(.499)
1.1	1.9	1.1	1.6	1.11	2.2
1.7	1.7	2.3	1.9	6.06	11.2
1.5	1.9	2.0	2.0	1.42	3.1
0.5	0.5	U(.25)	0.5	0.435	5.9
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	U(.249)	U(.25)	U(.246)	U(1.2)	U(.468)
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	0.3
U(.248)	U(.249)	U(.25)	U(.246)	U(.249)	U(.25)
U(.248)	0.4	0.4	0.8	0.462	0.7
3.4	3.1	4.4	4.2	5.8	10.3
1.5	1.9	1.8	1.8	1.35	2.0
2.3	2.6	2.4	2.6	2.18	2.9

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

KAG-BNT-COMP-01	KAG-BNT-COMP-02	KAG-BNT-COMP-03	KAG-BNT-COMP-04	KAG-BNT-COMP-05	PBG-SMB-COMP-01
34836.0	34837.0	34838.0	34839.0	35565	35566
A03V37.RPT	A03V38.RPT	A03V313.RPT	A03V314.RPT	E29VQ37.RPT	E29VQ38.RPT
1.6	1.2	1.1	3.3	3.2	0.622
0.7	U(.801 EMPC)	0.6	1.2	1.41	0.0601
U(.244)	U(.249)	U(.246)	U(.247)	U(.248)	U(.257)
U(.365 EMPC)	U(.608 EMPC)	U(.359 EMPC)	U(.828 EMPC)	0.357	U(.257)
0.3	U(.427 EMPC)	U(.246)	0.4	U(.462 EMPC)b	U(.257)
U(.244)	U(.249)	U(.246)	U(.247)	U(.248)	U(.554)
U(14.3 EMPC)	U(26.8 EMPC)	U(10.4 EMPC)	U(26.8 EMPC)	U(4.37 EMPC)	U(.632 EMPC)
U(.244)	U(2.9 EMPC)	U(.246)	U(.247)	U(.524 EMPC)	U(.484)
U(.768 EMPC)	U(.254)	U(.246)	U(.247)	U(.248)	U(.709)
U(.244)	U(.284)	U(.246)	U(.247)	U(.248)	U(.257)
U(.332 EMPC)	U(.255)	U(.246)	0.5	U(.354 EMPC)	U(.257)
U(.244)	U(.276)	U(.246)	U(.247)	U(.248)	U(.257)
U(.244)	U(.488)	U(47.6 EMPC)	U(56 EMPC)	U(.248)	U(.257)
U(.244)	U(.523)	U(.246)	U(.247)	U(.248)	U(.257)
0.4	U(.249)	U(.262 EMPC)	0.5	0.429	U(.257)
U(.488)	U(.498)	U(.492)	U(.494)	U(.496)	U(.515)
0.9	0.9	U(.852 EMPC)	1.1	0.821	U(.515)
3.1	4.8	1.2	6.1	6.61	1.2
0.7	U(.214)	0.6	1.6	1.41	0.615
U(.244)	2.4	U(.246)	1.8	1.35	U(.257)
0.3	U(.249)	U(.246)	0.4	U(.248)	U(.257)
1.2	U(.249)	0.4	0.3	U(.248)	U(.548)
U(.244)	U(.271)	U(.246)	0.5	U(.248)	U(.257)
U(.244)	U(.504)	U(.246)	U(.247)	U(.248)	U(.257)
0.4	U(.249)	U(.246)	0.5	0.429	U(.257)
2.6	1.9	1.5	2.6	4.4	2.1
1.1	0.1	0.7	1.8	1.9	0.12
2.9	4.6	2.7	5.6	2.8	0.72

PBG-SMB-COMP-2	PBG-SMB-COMP-03	PBG-SMB-COMP-5	PBG-SMB-COMP-4	PBG-WHS-COMP-1	PBG-WHS-COMP-2
34972.0	34898.0	35136.0	35569	35137.0	35138.0
A25V421.RPT	A24V58.RPT	B01V56.RPT	E29VQ311.RPT	B01V57.RPT	B01V58.RPT
0.2	0.5	0.5	0.866	0.5	0.7
U(.0649 EMPC)	U(.0905 EMPC)	0.1	0.0912	U(.0689 EMPC)	U(.0914 EMPC)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.427)	U(.25)	U(.25)
U(2.3 EMPC)	U(.871 EMPC)	U(.249)	U(.514 EMPC)	U(.37 EMPC)	U(.842 EMPC)
U(.25)	U(.24)	U(.249)	U(.373)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.545)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(4.52 EMPC)	U(1.69 EMPC)	U(0.334 EMPC)	U(.246)	U(.876 EMPC)	U(1.75 EMPC)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	0.5	0.3
U(.5)	U(.48)	U(.497)	U(.492)	U(.499)	U(.5)
U(.939 EMPC)	U(2.17 EMPC)	U(.497)	0.598	1.4	1.0
0.6	1.1	0.8	1.74	1.4	2.0
1.6	1.0	0.9	0.771	7.2	7.3
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.421)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	U(.25)	U(.25)
U(.25)	U(.24)	U(.249)	U(.246)	0.5	0.3
2.5	2.4	4.2	3.2	5.2	5.8
0.0	0.0	0.1	0.18	0.1	0.1
0.8	0.6	0.6	0.70	0.6	0.7

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

PBL-SMB-COMP-1	PBL-SMB-COMP-2	PBL-SMB-COMP-3	PBL-SMB-COMP-4	PBL-SMB-COMP-5	PBV-SMB-COMP-01
35139.0	35140.0	35141.0	35142.0	35143.0	34823.0
B01V59.RPT	B01V514.RPT	B01V515.RPT	B02V419.RPT	B02V420.RPT	A03VQ24.RPT
2.2	1.1	1.4	1.4	3.0	0.8
0.3	0.3	0.3	0.4	1.1	0.2
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	0.3	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.959 EMPC)	U(1.07 EMPC)	U(1.2 EMPC)	U(.77 EMPC)	U(4.5 EMPC)	U(6.66 EMPC)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	0.2	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(1.75 EMPC)	U(2.32 EMPC)	U(2.05 EMPC)	U(1.03 EMPC)	U(6.98 EMPC)	U(24.8 EMPC)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	0.3	U(.249)	0.3	U(.292 EMPC)	U(.25)
U(.498)	U(.499)	U(.498)	U(.5)	U(.499)	U(.499)
U(.962 EMPC)	2.1	U(1.01 EMPC)	1.5	1.6	0.7
2.8	1.8	1.7	2.0	3.5	1.1
0.6	0.4	0.5	0.4	1.1	0.2
1.0	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	0.3	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	0.3	U(.25)
U(.249)	U(.249)	U(.249)	U(.25)	U(.249)	U(.25)
U(.249)	0.3	U(.249)	0.3	U(.249)	U(.25)
2.9	1.8	2.2	2.0	2.1	1.0
0.6	0.4	0.5	0.5	1.5	0.2
1.1	0.9	1.0	1.0	2.3	1.6

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

PBV-SMB-COMP-02	PBV-SMB-COMP-03	PBV-SMB-COMP-04	PBV-SMB-COMP-05	PBV-WHS-COMP-01	PBV-WHS-COMP-02
34824.0	34825.0	34826.0	34827.0	34905.0	34906.0
A03VQ25.RPT	A03V31.RPT	A03V32.RPT	A03V33.RPT	A25V13.RPT	A25V14.RPT
1.0	0.9	1.0	1.8	3.8	7.6
0.2	0.3	0.2	0.4	0.3	0.6
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	U(.225)
U(.25)	U(.245)	U(.25)	U(.291 EMPC)	U(.278 EMPC)	0.6
U(.25)	U(.245)	U(.25)	U(.282 EMPC)	U(.206 EMPC)	0.4
U(.25)	U(.245)	U(.25)	U(.427)	U(.2)	U(.225)
U(6.45 EMPC)	U(8.7 EMPC)	U(7.66 EMPC)	U(12.9 EMPC)	U(3.7 EMPC)	U(11.5 EMPC)
U(.25)	U(.245)	U(.25)	U(.387)	U(.339 EMPC)	U(.225)
U(.25)	U(.245)	U(.25)	U(.545)	U(.2)	U(.225)
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	U(.251 EMPC)
U(.25)	U(.245)	U(.25)	U(.246)	0.3	0.7
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	U(.225)
U(21 EMPC)	U(19.2 EMPC)	U(24.4 EMPC)	U(42.1 EMPC)	U(10.5 EMPC)	U(18.2 EMPC)
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	U(.232)
U(.25)	U(.245)	U(.25)	U(.246)	0.9	1.6
U(.499)	U(.49)	U(.5)	U(.492)	U(.401)	U(.537 EMPC)
0.8	0.6	U(.722 EMPC)	0.8	2.1	2.5
1.3	1.2	1.3	2.3	5.5	15.0
0.2	0.5	0.2	0.4	1.9	8.8
0.3	U(.245)	0.6	0.4	1.7	7.9
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	0.4
0.7	0.5	U(.25)	U(.442)	0.4	1.6
U(.25)	U(.245)	U(.25)	U(.246)	0.6	1.3
U(.25)	U(.245)	U(.25)	U(.246)	U(.2)	U(.225)
U(.25)	U(.245)	U(.25)	U(.246)	1.2	2.2
0.9	1.1	1.6	2.2	5.6	12.3
0.3	0.4	0.3	0.6	0.8	2.0
1.6	1.9	1.7	2.8	1.6	3.5

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

PWD-WHS-COMP-1	PWD-WHS-COMP-2	PWB-WHS-COMP-1	PWB-WHS-COMP-2	SEC-LMB-COMP-1	SEC-LMB-COMP-2
34903.0	34904.0	34909.0	34910.0	35146.0	35147.0
A25V11.RPT	A25V12.RPT	A25V44.RPT	A25V45.RPT	B01V520.RPT	B02V11.RPT
5.0	4.5	U(8.27 EMPC)	8.9	0.4	2.0
0.3	0.3	0.7	0.8	U(.05)	0.2
U(.238)	U(.239)	0.3	0.5	U(.25)	U(.25)
1.6	1.1	0.4	0.6	U(.25)	U(.25)
1.5	1.5	0.3	U(.268 EMPC)	U(.25)	U(.25)
U(.238)	U(.239)	U(.212)	U(.219)	U(.25)	U(.25)
U(31 EMPC)	U(53.3 EMPC)	U(1.72 EMPC)	U(5.48 EMPC)	U(1.41 EMPC)	U(7.9 EMPC)
U(.33 EMPC)	U(.847 EMPC)	U(.212)	U(.219)	U(.25)	U(.25)
U(.238)	U(.239)	U(.212)	U(.219)	U(.25)	U(.25)
0.7	U(.633 EMPC)	U(.212)	U(.219)	U(.25)	U(.25)
1.2	1.0	0.3	0.4	U(.25)	U(.25)
U(.262 EMPC)	0.2	U(.212)	U(.219)	U(.25)	U(.25)
U(60.5 EMPC)	U(128 EMPC)	U(3.04 EMPC)	U(9.44 EMPC)	U(.968 EMPC)	U(4.10 EMPC)
U(.238)	U(.239)	U(.212)	U(.219)	U(.25)	U(.25)
1.9	1.8	0.9	1.0	0.5	0.3
U(.476)	U(.534 EMPC)	U(.423)	U(.438)	U(.5)	U(.5)
1.9	2.3	1.8	3.2	12.9	1.8
16.4	22.8	9.0	10.1	2.4	8.6
1.3	1.4	1.1	1.1	U(.05)	0.2
8.4	12.2	1.3	2.5	0.5	1.3
1.8	1.7	0.3	U(.219)	U(.25)	U(.25)
4.4	7.4	U(.212)	0.5	0.6	5.3
2.6	1.1	0.3	0.4	U(.25)	U(.25)
U(.238)	U(.239)	U(.212)	U(.219)	U(.25)	4.4
2.2	1.8	0.9	1.3	1.2	0.3
11.9	12.2	6.4	7.3	0.8	2.0
2.6	2.2	1.1	2.1	0.1	0.4
6.4	9.0	2.3	3.0	0.7	1.6

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

SEN-LMB-COMP-01	SEN-LEN-COMP-02	SFA-LMB-COMP-1	SFA-LMB-COMP-2	SFS-SMB-COMP-1	SFS-SMB-COMP-2
34899.0	34900.0	35148.0	35149.0	34970.0	34971.0
A24V59.RPT	A24V514.RPT	B02V12.RPT	B02V42.RPT	A25V419.RPT	A25V420.RPT
1.1	0.9	0.4	0.4	0.5	0.8
0.3	0.3	0.1	U(.0497)	0.3	0.5
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.249)
0.5	U(.5 EMPC)	U(.25)	U(.249)	U(.462 EMPC)	U(.746 EMPC)
1.0	1.0	U(.25)	U(.249)	U(.246)	U(.249)
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.249)
U(6.05 EMPC)	U(5.75 EMPC)	U(1.41 EMPC)	U(1.85 EMPC)	U(14.4 EMPC)	U(32 EMPC)
U(.219)	U(.236)	U(.25)	U(.249)	U(.416 EMPC)	U(1.11 EMPC)
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.797 EMPC)
0.3	0.3	U(.25)	U(.249)	U(.246)	U(.274)
0.8	0.9	U(.25)	U(.249)	U(.246)	U(.249)
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.272)
U(5.62 EMPC)	U(5.54 EMPC)	U(1.64 EMPC)	U(2.64 EMPC)	U(31 EMPC)	U(73.9 EMPC)
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.249)
0.7	0.6	U(.25)	U(.249)	U(.246)	0.3
U(.438)	U(.472)	U(.5)	U(.497)	U(.493)	U(.497)
U(.796 EMPC)	0.7	U(.5)	U(.497)	0.7	1.1
6.7	11.6	2.4	2.2	13.2	21.8
0.3	0.3	0.1	U(.0497)	0.4	0.7
3.3	3.4	0.3	0.4	4.3	15.4
1.0	1.0	U(.25)	U(.249)	U(.246)	U(.249)
0.8	0.7	0.4	0.4	2.8	5.9
1.1	1.2	U(.25)	U(.249)	U(.246)	U(.264)
U(.219)	U(.236)	U(.25)	U(.249)	U(.246)	U(.249)
0.7	0.6	U(.25)	U(.249)	U(.246)	0.3
1.4	1.3	1.3	1.5	1.2	1.5
1.2	1.0	0.1	0.0	0.3	0.5
2.0	2.0	0.7	0.7	2.6	5.3

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

SWG-SMB-COMP-1	SWG-SMB-COMP-2	SWP-SMB-COMP-1	SWP-SMB-COMP-2	
35150.0	35151.0	35152.0	35153.0	
B02V43.RPT	B02V44.RPT	B02V45.RPT	B02V46.RPT	
0.3	0.8	U(.0938 EMPC)	0.1	
0.1	U(.0924 EMPC)	0.7	1.0	
U(.371 EMPC)	U(.25)	U(.25)	U(.25)	
U(.25)	U(.25)	U(.808 EMPC)	1.0	
U(.25)	U(.25)	0.5	0.8	
U(.25)	U(.25)	U(.25)	U(.25)	
U(1.74 EMPC)	U(2.7 EMPC)	U(2.0 est)	U(2.0 est)	
U(.25)	U(.25)	U(.25)	U(.25)	
U(.25)	U(.25)	U(.25)	U(.25)	
U(.25)	U(.25)	0.3	0.5	
U(.25)	U(.25)	1.6	1.9	
U(.25)	U(.25)	U(.25)	U(.25)	
U(1.82 EMPC)	U(3.06 EMPC)	U(2.4 est)	U(2.4 est)	
U(.25)	U(.25)	U(.25)	0.5	
U(.25)	U(.25)	1.0	1.5	
U(.499)	U(.5)	0.6	1.1	
U(.499)	1.1	1.9	5.5	
1.7	3.2	5.5	9.3	
0.1	0.1	0.7	1.0	
0.3	0.4	U(.25)	16.0	
U(.25)	U(.25)	0.5	0.8	
0.4	0.8	1.9	15.2	
U(.25)	U(.25)	2.0	3.2	
U(.25)	U(.25)	U(.25)	2.8	
U(.25)	U(.25)	1.0	1.5	
1.1	1.6	0.9	1.2	
0.1	0.1	1.2	2.2	
0.7	0.9	1.9	2.5	

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

LOBSTERS					
Field ID	BBK-1T	BBK-2T	BBK-3T	BBK-4T	ERB-1T
Extract ID	35191.0	35192.0	35193.0	35194.0	35195.0
MS File	B03V32.RPT	B03V33.RPT	B03V34.RPT	B03V35.RPT	B03V36.RPT
Isomers					
2378TCDF	18.8	22.7	19.5	21.3	14.5
2378TCDD	1.6	1.7	1.7	1.3	0.8
12378PECDF	U(1.2)	U(1.24)	U(1.17)	U(1.22)	U(1.24)
23478PECDF	U(3.92 EMPC)	2.5	U(2.77 EMPC)	U(2.54 EMPC)	2.4
12378PECDD	4.4	3.3	4.7	3.6	3.0
123478HXCDF	U(1.46 EMPC)	U(1.24)	U(1.17)	U(2.88)	U(6.91)
123678HXCDF	U(13.7 EMPC)	U(14.2 EMPC)	U(11.1 EMPC)	U(13.8 EMPC)	U(18.4 EMPC)
234678HXCDF	U(1.2)	U(1.24)	U(1.17)	U(2.54)	U(6.1)
123789HXCDF	U(1.2)	U(1.24)	U(1.17)	U(3.6)	U(8.63)
123478HXCDD	1.7	1.4	1.8	1.5	1.7
123678HXCDD	5.3	5.0	5.9	4.9	6.3
123789HXCDD	U(1.2)	U(1.24)	U(1.17)	U(1.22)	1.8
1234678HPCDF	U(7.88 EMPC)	U(6.19 EMPC)	U(6.56 EMPC)	U(4.5 EMPC)	U(8.76 EMPC)
1234789HPCDF	U(1.2)	U(1.24)	U(1.17)	U(1.22)	U(1.24)
1234678HPCDD	8.2	6.9	8.1	8.0	10.1
12346789OCDF	U(2.39)	U(2.48)	U(2.33)	U(2.44)	U(2.49)
12346789OCDD	9.6	7.3	6.2	8.4	8.8
TCDF	66.7	52.8	51.1	56.7	41.2
TCDD	17.4	13.7	7.7	8.5	11.7
PECDF	58.1	42.1	23.6	32.9	39.1
PECDD	26.1	15.0	11.5	13.3	13.6
HXCDF	11.2	5.2	6.4	7.7	U(6.91)
HXCDD	34.6	26.5	33.0	31.4	48.1
HPCDF	U(1.2)	U(1.24)	U(1.17)	U(1.22)	U(1.24)
HPCDD	22.1	18.7	21.5	21.4	25.3
% Lipid	23.9	20.7	15.0	16.0	21.3
D/F I-TE min	6.5	7.6	6.8	6.0	6.0
D/F I-TE max	10.5	9.6	9.9	9.8	10.2

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

ERB-2T	ERB-3T	ERB-4T	KRP-1T	KRP-2T	KRP-3T
35196.0	35197.0	35198.0	35199.0	35200.0	35201.0
B03V37.RPT	B03V38.RPT	B03V39.RPT	B03V314.RPT	B03V315.RPT	B03V316.RPT
10.7	15.1	11.1	41.0	55.6	52.5
0.6	U(1.18 EMPC)	0.5	5.1	4.7	4.6
U(1.22)	U(1.18)	U(1.2)	U(1.21)	U(1.18)	U(1.19)
U(2.22 EMPC)	4.2	1.9	U(1.75 EMPC)	U(1.34 EMPC)	2.4
2.6	3.4	2.2	5.0	5.2	4.3
U(1.62)	U(1.58 EMPC)	U(2.01)	U(2.92 EMPC)	U(3.3 EMPC)	U(1.88)
U(8.27 EMPC)	U(21.4 EMPC)	U(10.1 EMPC)	U(35.6 EMPC)	U(24.4 EMPC)	U(12.3 EMPC)
U(2.15 EMPC)	U(1.93 EMPC)	U(2.43 EMPC)	U(2.54 EMPC)	U(2.7 EMPC)	U(2.84 EMPC)
U(2.02)	U(1.24)	U(2.51)	U(2.37)	U(1.18)	U(2.35)
U(1.22)	U(1.94 EMPC)	U(1.2)	U(1.93 EMPC)	1.8	1.8
3.4	5.5	3.5	8.5	7.5	7.7
U(1.22)	U(1.18)	U(1.2)	U(1.4 EMPC)	U(1.99 EMPC)	2.0
U(4.93 EMPC)	U(12.6 EMPC)	U(5.32 EMPC)	U(12 EMPC)	U(19.4 EMPC)	U(4.57 EMPC)
U(1.22)	U(1.18)	U(1.2)	U(1.21)	U(1.18)	U(1.19)
4.9	7.2	5.8	9.0	9.9	8.8
U(2.43)	U(2.42)	U(2.41)	U(2.42)	U(2.37)	U(2.39)
4.2	5.7	5.5	7.6	6.1	5.6
31.6	59.3	30.6	118.0	117.0	93.9
6.8	16.0	7.2	25.2	14.2	14.8
20.4	43.7	26.6	65.0	54.7	53.6
2.6	15.6	11.4	19.3	21.7	17.6
3.6	6.8	3.9	11.9	14.7	12.3
23.0	44.8	26.5	42.3	41.1	42.7
U(1.22)	U(1.18)	U(1.2)	U(1.21)	U(1.18)	U(1.19)
13.9	27.1	16.2	21.9	22.0	20.2
11.7	13.4	12.9	13.9	18.1	11.3
3.4	5.9	4.1	12.6	13.9	14.5
6.3	10.2	6.2	18.4	18.2	16.5

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

KRP-4T	PRP-1T	PRP-2T	PRP-3T	PRP-4T	PBS-1T
35202.0	35203.0	35204.0	35205.0	35206.0	35207.0
B03V317.RPT	B03V318.RPT	B03V319.RPT	B03V320.RPT	B03V321.RPT	B03V322.RPT
43.9	32.9	34.1	26.6	29.1	17.3
3.8	2.7	1.9	2.0	2.2	1.1
U(1.2)	U(1.24)	U(1.2)	U(1.2)	U(1.21)	U(1.24)
2.9	U(4.12 EMPC)	2.8	U(1.2)	U(1.21)	U(1.24)
5.0	4.6	4.8	4.0	4.0	U(4.38 EMPC)
U(1.54 EMPC)	U(2.84 EMPC)	U(2.6 EMPC)	U(4.17 EMPC)	U(3.05 EMPC)	U(4.43 EMPC)
U(16.2 EMPC)	U(19.3 EMPC)	U(17.5 EMPC)	U(16.7 EMPC)	U(11.3 EMPC)	U(60.2 EMPC)
U(1.59 EMPC)	U(1.51 EMPC)	U(2.12 EMPC)	U(3.14 EMPC)	U(1.96 EMPC)	U(4.88 EMPC)
U(1.52)	U(1.24)	U(1.24)	U(1.2)	U(1.21)	U(1.24)
1.5	2.9	2.3	2.5	2.2	2.0
7.1	11.9	8.6	9.5	8.8	9.5
U(1.2)	3.1	2.0	3.0	2.5	U(1.28 EMPC)
U(4.12 EMPC)	U(14.5 EMPC)	U(9.8 EMPC)	U(12 EMPC)	U(7.08 EMPC)	U(47 EMPC)
U(1.2)	U(1.24)	U(1.2)	U(1.2)	U(1.21)	U(1.24)
8.2	25.5	18.5	22.9	26.1	6.7
U(2.4)	U(2.48)	U(2.39)	U(2.39)	U(2.43)	U(2.49)
7.7	20.7	17.6	17.5	24.4	5.3
83.6	103.0	80.1	69.3	75.0	52.0
17.0	26.3	20.9	16.8	19.1	26.6
59.4	99.4	65.4	55.4	64.1	37.9
24.3	27.4	25.0	22.8	20.3	22.1
10.5	27.8	16.1	22.2	15.1	10.3
38.6	87.6	58.1	64.9	62.6	49.6
U(1.2)	U(1.24)	U(1.2)	U(1.2)	U(1.21)	U(1.24)
21.2	72.0	50.2	55.4	72.3	17.1
11.6	19.9	15.2	14.3	20.8	10.9
13.1	10.4	10.6	8.4	8.7	4.0
15.4	15.1	13.1	11.7	11.2	14.6

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

PBS-2T	PBS-3T	PBS-4T		
35208.0	35209.0	35210.0		
B03V323.RPT	C11V11.RPT	C11V12.RPT		
21.5	23.7	17.0		
1.3	1.5	1.3		
U(1.23)	U(1.22)	U(1.24)		
U(1.37 EMPC)	U(1.71 EMPC)	1.6		
5.5	5.6	4.7		
U(4.83 EMPC)	U(1.35)	U(1.99 EMPC)		
U(64 EMPC)	U(45.8 EMPC)	U(25.8 EMPC)		
U(3.02 EMPC)	U(2.36 EMPC)	U(1.92 EMPC)		
U(3.48)	U(1.68)	U(1.24)		
3.0	2.6	2.1		
15.8	13.9	11.1		
U(1.9 EMPC)	2.7	2.9		
U(76.3 EMPC)	U(23.3 EMPC)	U(16.2 EMPC)		
U(1.23)	U(1.22)	U(1.24)		
16.7	14.5	14.5		
U(2.46)	U(2.44)	U(2.48)		
8.2	7.6	10.0		
80.4	59.3	32.1		
44.6	9.2	7.3		
69.2	39.9	42.8		
49.2	28.0	17.8		
17.5	12.1	8.8		
81.3	72.3	55.7		
U(1.23)	U(1.22)	U(1.24)		
43.1	41.6	37.3		
16.5	12.7	11.6		
8.3	8.7	7.9		
17.5	15.0	11.2		

Appendix 2. Dioxin and Furan Concentrations in 1995 Fish and Shellfish Samples (pg/g)

QA						
Field ID	Method Blank B18	Method Blank B19	Method Blank B20	Method Blank B21	Method Blank B22	Method Blank B23
Extract ID	34758.0	34844.0	34914.0	34980.0	35157.0	35214.0
MS File	A23V61.RPT	A03VQ23.RPT	A24V51.RPT	A25V42.RPT	B01V41.RPT	B03V31.RPT
Isomers						
2378TCDF	0.2	U(.05)	U(.05) (a)	U(.283)	U(.144 EMPC) (a)	U(1.31)
2378TCDD	U(0.0717) (a)	U(.0521)	U(.05)	U(.564)	U(.085) (b)	U(2.75)
12378PECDF	U(.25)	U(.25)	U(.25)	U(.565)	0.5	U(2.52)
23478PECDF	U(.25)	U(.25)	U(.25)	U(.569)	U(.25)	U(2.54)
12378PECDD	U(.25)	U(.25)	U(.25)	U(.97)	0.5	U(4.78)
123478HXCDF	U(.25)	U(.25)	U(.25)	0.4	0.5	U(1.25)
123678HXCDF	U(.25)	U(.25)	U(.25)	U(.434 EMPC)	0.6	U(2.8 EMPC)
234678HXCDF	U(.25)	U(.25)	U(.25)	U(.25)	0.6	U(1.25)
123789HXCDF	U(.25)	U(.25)	U(.25)	U(.25)	0.5	U(1.25)
123478HXCDD	U(.25)	U(.25)	U(.25)	U(.898)	0.6	U(2.23)
123678HXCDD	U(.25)	U(.25)	U(.25)	U(.815)	0.6	U(2.03)
123789HXCDD	U(.25)	U(.25)	U(.25)	U(.889)	U(.623 EMPC)	U(2.21)
1234678HPCDF	U(.25)	U(.25)	U(.25)	U(.483)	0.9	U(1.61 EMPC)
1234789HPCDF	U(.25)	U(.25)	U(.25)	U(.906 EMPC)	0.7	U(1.25)
1234678HPCDD	0.3	U(.25)	0.3	U(1.73)	0.8	U(2.7)
12346789OCDF	U(.5)	U(.5)	U(.5)	U(5.55)	1.3	U(8.71)
12346789OCDD	9.5	U(.5)	1.4	U(5.89)	2.0	U(8.72)
TCDF	0.5	0.1	U(.05)	U(.283)	U(.0605)	30.0
TCDD	U(.05)	U(.0521)	U(.05)	U(.564)	U(.085)	U(2.75)
PECDF	U(.25)	0.3	U(.25)	U(.567)	0.9	U(2.53)
PECDD	U(.25)	U(.25)	U(.25)	U(.97)	0.5	U(4.78)
HXCDF	U(.25)	U(.25)	U(.25)	0.4	2.3	U(1.25)
HXCDD	U(.25)	U(.25)	U(.25)	U(.865)	1.2	U(2.15)
HPCDF	U(.25)	U(.25)	U(.25)	U(.522)	1.7	1.3
HPCDD	0.3	U(.25)	0.3	U(1.73)	0.8	U(2.7)
% Lipid	3.6	1.7	5.4	4.8	2.8	15.3
D/F I-TE min	0.0	0.0	0.0	0.0	0.7	0.0
D/F I-TE max	0.6	0.5	0.5	1.8	1.0	8.0

APPENDIX 3

2378-TCDD AND 2378-TCDF IN SLUDGE FROM

MAINE WASTEWATER TREATMENT PLANTS

APPENDIX 3. DIOXIN AND FURAN IN SLUDGE FROM MAINE WASTEWATER TREATMENT PLANTS (pg/g dry weight)

LOCATION	DATE	%MOIST	TCDD	TCDF
AUBURN VPS	951005		1.3	17.9
AUGUSTA SANITARY DISTRICT	900409		<1.2	1.3
	900608		<3.9	2.5
	900608		E2.1	10.2
	900914		<20.0	E20.0
	900809		<20	
	910108		<5	5.0
	910220		<1.9	0.8
	910301		<1.9	4.8
	920416		1.9	1.9
	920427		<1.0	1.9
	930223		<1.3	<1.3
	940215		<1.0	<1.0
			<0.02	0.0
			<0.23	1.8
	950227		1.9	<1
ANSON-MADISON SANITARY DISTRICT	910408		<1.3	2.2
	911001		1.7	4.6
BANGOR	950104		20.6	20.7
	950104		20.3	20.2
BERWICK SEWER DISTRICT	861111		<2.5	<4.0
	890301	76.4	14.0	19.9
	890927	75.3	<12.1	<12.1
	891208	87.5	1152.0	872.0
BIDDEFORD	900208		7.2	30.0
	900208		39.0	310.0
	910501		<0.86	3.7
	910703		<0.57	<0.95
	920204		<1.5	2.9
	930121		<2.4	<3.2
	940209		<0.19	<0.48
	940913		<1.0	<2.9
	950815		<.22	1.6
BOISE CASCADE CORP RUMFORD	850621		32.0	
	880602		105.0	674.0
	890108	77.1	114.0	569.0
	890407	73.1	46.5	184.0
	890628	76.8	E9.91	134.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
BREWER	920520		<2.1	36.0
	920901		<6.0	110.0
	921116		3.8	19.0
	930202		<3.7	11.0
	930511		1.2	9.8
	930810		4.1	24.0
	931118		3.8	26.0
	940201		3.2	24.0
	940517		<0.9	14.0
	940823		4.5	26.0
	941108		5.2	36.0
	950613		<1	18.0
BOWATER MILLINOCKET	850618		<0.4	
	880602		<1.9	7.3
	940414		<7.4	<8.9
	940506		<.9	6.7
	950316		<.6	4.0
CORINNA SEWER DISTRICT	850506			
	871117		<11.9	<28.8
	880301		<3.0	8.5
	890222		<13.0	
	890510		<5.0	
	900131		2.3	127.0
	900606		<4.0	85.4
	900606		<4.9	82.2
	900919		<10.0	50.0
	901024		<8.0	
	910313		<5.0	
	910514			
	920304		<3.9	<8.4
	930405		<4.8	19.9
	930811		<9.9	68.6
	940308		<13.1	46.0
	940810		<5.6	7.8
	950321		<2.1	13.3
	960206		<1.8	12.7
CROWN VANTAGE BERLIN NH	88		104.0	2930.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
FRASER PAPER LTD MADAWASKA	880903	68.3	13.9	233.0
	890106	79.1	E23.4	204.0
	890406	71.3	E3.83	12.9
	890930	80.1	5.0	E26.6
	940426		<.1	0.8
GARDINER WATER DISTRICT	900918		<0.87	4.6
	910401		1.4	4.4
	911002		<0.54	5.1
	920504		<3.5	9.4
	921116		<.93	<6.4
	930407		<0.13	0.9
	931115		<1.6	<18
	931115			
	931115		<0.9	
	940329		<0.2	<1.1
	941018		<1.2	<4.3
	950221		<2.8	5.2
	951003		<1.7	
GEORGIA PACIFIC CO WOODLAND	890113	75.8	<6.2	<3.55
	890424	74.7	<0.63	<4.74
	890718	66.0	<1.76	12.9
	891217		0.9	3.2
	910630		<1	2.0
	910630		<1	1.0
	910630		<1	<1
	910630		1.0	4.0
	910630		<1	<1
	910630		<1	2.0
	911231		<1	2.0
	911231		2.0	5.0
	911231		<1	3.0
	911231		<1	2.0
	930108		<1	<1
	940530		<5.0	<5.0
	941222		<5.0	11.9
	950331		<5.0	14.3
	950630		<5.0	<5.0
	950930		<5.0	24.5
	951231		<1.0	3.4
HARTLAND WASTEWATER TREATMENT PLANT	881007	65.0	<2.86	<1.71
	881221	65.5	<7.25	E6.09
	890312	64.3	<0.28	5.6
	890627	63.3	<1.36	6.5

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
HAWK RIDGE COMPOST	1989-90	mean n=6	6.6	15.9
UNITY	1991	(1.6-13)		mean n=4
(compost)	900420		2.9	15.0
	900507		3.4	6.0
	900628		3.4	31.0
	900712		5.0	40.0
	900817		3.4	31.0
	900820		3.0	30.0
	900820		5.0	40.0
	901010		<5	30.0
	910115		0.6	6.4
	910207		4.0	59.5
	910806		1.6	15.0
	920123		2.6	18.0
	920318		<1	
	920715		<2.0	34.0
	920818		<1.0	18.0
	921007		2.2	23.0
	930111		<2.2	12.0
	930406		1.7	16.0
	930629		1.7	22.0
	931213		3.4	28.0
	940101		2.6	27.0
	940422		<1.0	12.0
	940422		<1	9.1
	940725		1.6	13.0
	941024		<2.4	13.0
			4.9	33.0
	950724		<1	12.0
	951012		1.1	12.0
INTERNATIONAL PAPER CO	850621		51.3W	
JAY	870115		190.0	760.0
	880218		24.0	130.0
	880219		23.0	121.0
	880223		14.0	75.0
	880225		57.0	250.0
	880226		15.0	79.0
	880227		13.0	79.0
	881231		16.6W	143W
	890124		15W	77W
	890126		28.0	112.0
	890323		7.7W	42.6W
	890417		24.0	150.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
INTERNATIONAL PAPER CO	950712		7.2	39.0
JAY	960125		2.6	16.0
	960126		2.8	16.0
	960227		<1.0	14.0
	960228		2.3	14.0
JAMES RIVER CORP	880801		12.0	34.0
OLD TOWN	881225	78.6	301.0	963.0
	890423	78.7	380.0	1197.0
	890718	68.8	50.6	478.0
	950103		8.8	65.0
KENNEBEC SANITARY	870713			
TREATMENT DISTRICT	871105			
WATERVILLE	880118			
	880322			
	880518			
	880921			
	890711			
	891011			
	900410		E7.9	121.0
	900824		3.3	54.0
	901101		3.6	12.0
	901221		3.5	6.7
	901221		3.5	19.0
	910408		<2.3	<3.3
	910606		<2.9	<5.0
	910808		2.3	53.0
	910911		3.1	4.1
	920226		2.6	20.0
	920708		<1.0	11.0
	930914		1.1	6.3
	941021		<1.0	8.2
	951113		<1	1.3
KIMBERLY-CLARK	871008		36.0	
WINSLOW	871201		13.5	
	880331		25.0	219.0
	880630		19.0	177.0
	880930		22.0	189.0
	881231		17.0	181.0
	890331		18.0	177.0
	890628		14.0	89.0
	890927		11.0	67.0
	891231		13.0	115.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
KIMBERLY-CLARK	900201		12.0	86.0
WINSLOW	900628		12.0	94.0
	900928		9.4	76.0
	901231		7.2	63.0
	910411		8.3	100.0
	910630		4.6	62.0
	910930		6.5	69.0
	911203		6.3	68.1
	920225		6.5	72.1
	920623		5.2	55.0
	921006		5.1	60.0
	921228		7.2	59.0
	930317		4.7	47.0
	930629		4.2	37.0
	930917		3.9	42.0
	931231		5.2	44.0
	940101		3.5	31.0
	940401		3.7	27.0
	940909		4.9	33.0
	941231			30.0
	950331		4.4	42.0
	950608		<1	24.0
	950930		2.2	25.0
	951231		3.0	34.0
LEWISTON-AUBURN	871231		<1.0	mean for year (n=4)
TREATMENT PLANT	881031		0.0	
	900809		E10	9.0
	910306		<7.3	<7.3
	920610		<0.8	4.5
	930922		<2.7	<2.5
	950405		<2.2	0.8
LINCOLN PULP & PAPER CO	881119		48W	223W
LINCOLN	890123	80.9	44.0	203.0
	890123		44.0	173.0
	890407	85.1	49.0	298.0
	890407		41.0	219.0
	890831	83.5	182.0	640.0
	890831		156.0	625.0
	890831		41.0	220.0
	890831		59.0	294.0
	921231		20.4	91.6
	931231		9.7	86.0
	940331	PRI SL	14.9	154.0
	940331	SEC SL	97.1	734.0
	960431		4.2	25.1

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
OAKLAND TREATMENT PLANT	910304		<2.5	10.0
	910329		<5	10.0
	920415		<1.0	<1.0
	920415		<1	<1
	930408		<1.0	<1.0
	930501		<1.0	11.0
	940426		<1.0	<1.0
OLD TOWN	880525		<3.0	<3.0
	900212		<2.2	16.7
	910918		<2.9	6.6
	910918		<2.2	
ORONO TREATMENT PLANT	900316		2.1	
	900412		8.5	
	901001		3.5	9.2
	901021		3.9	
	910324		<2.1	9.5
	910918		<2.9	6.6
	920323		<0.6	7.6
	920328		9.4	
	920915		<0.5	5.4
	921015		1.1	
	930427		1.3	
	930427		<0.5	3.4
	940502		<0.6	2.5
PERC	910417		<2.0	9.9
PORTLAND WATER DISTRICT PORTLAND	861205			
	870402			
	871124			
	880913			
	891206		E1.2	11.3
	891206		1.6	14.5
	901002		<3	10.0
	901002		<3	20.0
	910826		<64	<32
	910828		<66	<140
	920715		<1.1	6.4
	920715		0.9	7.6
	930719		<1	2.3
	930719		<1.1	<3.2
	940718		<1.0	0.8
	950727		0.5	1.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
WESTBROOK WWTF	861205			
	870402			
	871119			
	891205		E1.6	14.5
	901001		<3.0	9.0
	910826		<64	<32
	920714		<1.1	7.6
	930719		<1.0	3.2
REGIONAL WASTE SYSTEMS PORTLAND	890111	ash	5.5	28.0
	890112	ash	6.0	24.0
	890113	ash	10.0	50.0
	890114	ash	10.0	20.0
	890121	ash	6.0	90.0
	900211	ash	E20	210.0
ROBINSON MANUFACTURING OXFORD	870113		10.1	17.5
	880419		<0.4	<0.2
	881004		<7.3	<9.6
	890119		<0.39	<1.2
	890119D		<2.1	<1.1
	910226		<3.0	<3.0
	910305		<3	<0.3
	910308		<3	<3
	910323		<5	<5
	910323		<3	<3
	920610		<1.2	<1.0
SD WARREN CO SKOWHEGAN	861217		<2	47.0
	870519		13.0	21.0
	870930			
	871215		60.0	
	880325		27.0	88.0
	880630	EPA	67.0	33.0
	881014		40.0	98.0
	881220		54.0	177.0
	890303		54.0	92.0
	890629		23.0	53.0
	890926		<.8	16.0
	891205		18.0	52.0
	900314		<18	23.0
	900620		35.0	73.0
	900916		45.0	86.0
	901215		39.5	115.0
	910324		23.1	51.0
	910626		39.4	146.0
	910910		69.9	260.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
SD WARREN CO SKOWHEGAN	920624		33.0	856.0
	920923		20.0	39.0
	921218		15.0	45.0
	930107		11.0	31.0
	930616		23.0	73.0
	930916		56.0	170.0
	931229		42.0	110.0
	940108		31.0	95.0
	940627		33.0	89.0
	940926		12.0	36.0
	941212		11.0	20.0
	950313		3.6	15.0
	950510		3.3	11.0
	950914		9.6	25.0
	951120	comb	1.2	4.2
SD WARREN CO. WESTBROOK	850620		17.2	
	870929		31.0	
	871231		21.0	135.0
	880331		5.6	21.0
	880401		8.7	3.9
	880630		13.0	55.0
	881207		19.0	127.0
			19.0	69.0
	890106		<1.8	31.0
	890600		<1.2	13.0
	890600		5.3	35.0
	890600		<.2	0.2
	890600		<.4	8.8
	890600		69.9	60.0
	891031		5.0	30.0
	891130		3.0	30.0
	891231		7.0	50.0
	900131		6.0	20.0
	900228		2.7	24.6
	900331		5.1	33.6
	900430		5.9	34.6
	900531		5.3	25.8
	900630		19.0	26.0
	900730		5.2	20.6
	900831		2.9	12.1
	900930		2.5	10.0
	901231		7.7	35.7
	910917		70.0	275.0

APPENDIX 3. (CONT.)

LOCATION	DATE	%MOIST	TCDD	TCDF
SD WARREN CO. WESTBROOK	910331		3.4	21.5
	910630		2.9	19.6
	910930		3.8	14.2
	911231		2.4	25.1
	920331		1.2	19.4
	920505		1.6	10.8
	920821			24.5
	940131		0.9	11.6
	940324			12.3
	940728		2.1	17.3
	941213		5.3	29.2
	950329		1.2	20.0
	950602		1.0	10.1
	950911			18.3
	951120		1.1	23.3
S PORTLAND STP	880000		<8.65	<48
	900314		<5.3	<3.5
	900314		<2.7	<5.4
	910508			<10
	910531		<5	
	920401		<1.0	<0.8
	920428		<0.8	1.4
	920714		0.9	6.4
	930324		<2.8	<2.8
	940315		<1.0	3.9
	941005		8.7	48.0
	950405		<1	3.3
STATLER TISSUE CO AUGUSTA	880930	62.6	36.9	414.0
	881223	61.4	37.6	326.0
	890403	61.6	34.6	242.0
	890628	65.5	17.7	414.0

D=duplicate analysis

APPENDIX 4

2378-TCDD AND 2378-TCDF IN WASTEWATER

FROM MAINE PULP AND PAPER MILLS

APPENDIX 4. 2378-TCDD AND 2378-TCDF IN WASTEWATER FROM MAINE PULP AND PAPER MI

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
ANSON MADISON	920408	<3	<3
	921001	<3	20
BOISE CASCADE	880518	120	570
	890301	25	80
	890807	<6	20
	890810	<13	20
	890814	<5	13
	890817	<5	18
	890821	<8	21
	890824	<5	10
	890829	<5	18
	890831	<11	20
	890905	<11	20
	890907	<9	18
	891023	<3	7
	891026	<5	6
	891222	<5	20
	900216	<2	6
	900216	<1	7
	900515	<10	<8
	900515	<1	5
	900627	<3	8
	900627	<3	9
	920217	<4.6	14
	920221	<4.6	13
	920311	<4.6	9.9
	920316	3.2	8.7
		3.5	12
		4.6	17
	920326	4.5	8.5
	920412	6.3	24
	920613	<4.6	6.8
	920708	<4.6	<5.8
	920831	<4.6	3.5
	920904	<3.8	
	921104	<3.7	
	921201	<2.4	
	930105	<2.4	
	930201	<2.4	<10
	930401	<2.8	<10
	930501	<2.4	<10
	930701	<3.9	12
	930801	<2.8	<3.4

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
BOISE CASCADE	931001	<3.2	<10
	931101	<3.9	<3.6
	940130	<2.8	<5.2
	940219	<1.9	<1.3
	940417	<3.3	<2.4
	940509	<3.6	<1.2
	940728	<3.7	<1.7
	940829	<2.7	<2.0
	941024	<2.1	<1.1
	941205	<2.7	<1.8
	950131	<10	<10
	950229	<10	<10
	950430	<10	<10
	950531	<10	<10
	950731	<10	<10
	950831	<10	<10
	951031	<10	<10
	951130	<10	<10
BREWER	920624	<5.9	
	930429	<3.9	
	941129	7.4	
	950503	<3.6	
	960416	<10	
GEORGIA PACIFIC	880101	6.8	25
	900316	<5	4
	900423	<3	<6
	900531	<8	<5
	900619	<3	<1
	900716	<1	<3
	900807	<2	<5
	910630	<10	<10
	910630	<10	<10
	910630	<11	<11
	910630	<11	<11
	910630	<11	<11
	910630	<11	<11
	910630	<10	<10
	910630	<11	<11
	910630	<11	<11
	911231	<10	<10
	911231	<10	<10
	911231	<11	<11
	911231	<11	<11
	911231	<10	<10

SOURCE	DATE		TCDD (pg/l)	TCDF (pg/l)
GEORGIA PACIFIC	911231		<11	<11
	911231		<10	<10
	911231		<11	<11
	911231		<11	<11
	930408		<10	<10
	930506		<10	<10
	930713		<10	<10
	940530		<10	<10
	941222		<10	<10
	950331		<10	<10
	950630		<10	<10
	950930		<10	<10
	951231		<10	<10
INTERNATIONAL PAPER	880101		88	420
	880715		30	150
	890307		30	100
			E6	E20
			E20	E20
	890310		16	74
	890616		<8	980
	890621		17	140
	890713		<16	50
	890720	DEP	30	150
	890818		20	110
	900413		<10	90
	910924		<10	60
	910926		<10	60
	911129		50	210
	911219		<20	<80
	920125		20	110
	920126		20	110
	920127		30	100
	920128		30	100
	920129		13.7	49.9
	920312		19.3	65.6
	920320		14.8	73.9
	920423		<13.9	59.1
	920610		<5.7	29.5
	920617		<6.3	30.8
	920723		<8.4	33.6
	920819		6.6	29.7
	920923		<2.6	<2.0
	921111		<6.1	22.4
	921202		<2.6	<14.4
	930125		5.4	19.6

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
INTERNATIONAL PAPER	930222	<5.3	25.5
	930420	<2.0	16.7
	930527	4.3	10.3
	930716	<5.2	28.9
	930826	<5.3, <6.5	21.5, 19.2
	930910	<8.6	9.4
	931022		19.5
	931119	<3.6	19.5
	931224	10.9	31.1
	940125	<4.1	21.6
	940226	7.3	38
	940422	7.7	41.1
	940520	4.1	25.6
	940722	<3.4	16.7
	940829	<7.9	31.8
	941027	<3.4	25.3
	941125	<6.8	24.4
	950126	<5.0	20.9
	950222	<3.6	21.4
	950420	<2.5	25.6
	950527	<1.8	24.1
	950724	<3.2	16.1
	950826	<4.9	7.5
	950929	<6.0	15.4
	951020	<8.5	12.9
	951122	<3.8	10.5
JAMES RIVER	880630	39	
	890131	27	120
	890222	210	340
	890223	92	290
	890224	77	340
	890320		34
	890324		24
	890325	36	73
	890405	30	110
	890410	17	52
	890411	32	89
	890824	32	94
	890831	13	150
	890911	<4.1	14
	890915	<3.3	<8.1
	890921	<5.7	13
	890927	<5.3	9.7
	891011	<3	11
	891019	<5.2	14

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
JAMES RIVER	891102	<6	18
	891106	6.7	22
	891114	<9.5	<7.1
	891127	<6.4	20
	891206	<8.4	13
	891213	<8.3	20
	891221	<4.7	23
	900105	<6.8	<8.3
	900111	<9	<8.5
	900118	<5.9	6.1
	900125	<6.7	10
	900207	<4.6	17
	900214	<6.6	23
	900222	<7.3	15
	900301	<6	11
	900308	<3	12
	900315	<4	16
	900329	<7.4	14
	900407	<7.2	24
	900502	<7	19
	900729	<9.9	49
	910330	17	70
	910430	19	65
	910530	9.5	41
	910630	6.8	43
	910830	11	66
	911030		7.9
	911130	<7.7	<16
	920330	<5.7	50
	920730	16	69
	920830	<4.9	23
	921030	<3.0	
	921230	4.8	
	930130	<5.0	14
	930330	<4.9	12
	930530	<4.2	11
	930630	<2.8	15
	930830	<1.6	9.2
	930930	<3.5	7.6
	931130	<3.1	32
	931230	<3.2	19
	940230	<4.8	7.7
	940330	<4.6	12
	940530	<1.5	<4.5
	940630	<3.5	9.2
	940830	<2.0	<4.8

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
JAMES RIVER	940930	<4.6	<6.8
	941130	<9.5	<10
	941230	<1.1	5.8
	942730	<1.1	5.8
	950130	<2.4	8.2
	950119	<2.4	8.2
	951230	<1.1	5.8
	950430	<1.4	5.6
	950430	8	36
	950421	<1.4	5.6
	950622	<2	6.8
	950928	<3.8	8.1
	951129	<5.4	13
	951228	<1.4	6.2
KIMBERLY-CLARK	930308	<10	<12
	930623	<4.6	<3.9
LINCOLN PULP AND PAPER	881130	32	130
	920817	11.2	69.8
	920908	<11	27.3
	921117	7.7	39.1
	921216	<1.9	9.5
	931230	<5.5	<17.3
	940417	1.9	7.5
	950824	1.3	8.5
	960409	1.3	8.5
SD WARREN (Skowhegan)	880630	16,19	63,100
	900710	<7.1	8.4
	900716	<6.1	5.9
	dup	<5.5	<7.3
	900724	<3.6	<3.9
	930105	<3.4	9.2
	930224	<4.7	15
	930311	<4.0	10
	930409	6.8	18
	930616	6.3	14
	930917	7	17
	931203	7.6	19
	940107	<3.8	9.2
	940624	<10	13
	940923	<11	8.7
	941209	<4.6	6.6

SOURCE	DATE	TCDD (pg/l)	TCDF (pg/l)
SD WARREN (Skowhegan)	950310	9	11.6
	950505	<10.3	6.6
	950616	<3.9	<9.4
	950807	5.8	14.5
	950911	2.8	15.3
	951124	<4.2	38.7
	951208	<7.4	29
SD WARREN (Westbrook)	880101	6.3	
	1989	1	
	901118	<3	8
	910425	<5	<5
	910716	<8	<5
	911203	<8	<5
	920218	<2.8	7
	920507	<1.2	4.6
	920715	<5.8	<4.9
	921114	<1.8	3.9
	930303	<7.8	16
	930617	<1.5	<6.4
	930915	<2.4	5.7
	931208	<3.4	<7.3
	940130	<6.5	<9.8
	940324		<5.9
	940727	3.6	7.8
	941212	<6.0	<15.8
	950730	<5.4	9.8
	950615	<2.8	<9.9
	950815	<4.3	<21.9

APPENDIX 5

2378-TCDD AND 2378-TCDF IN SEDIMENTS

FROM VARIOUS STATIONS ON THE ANDROSCOGGIN RIVER

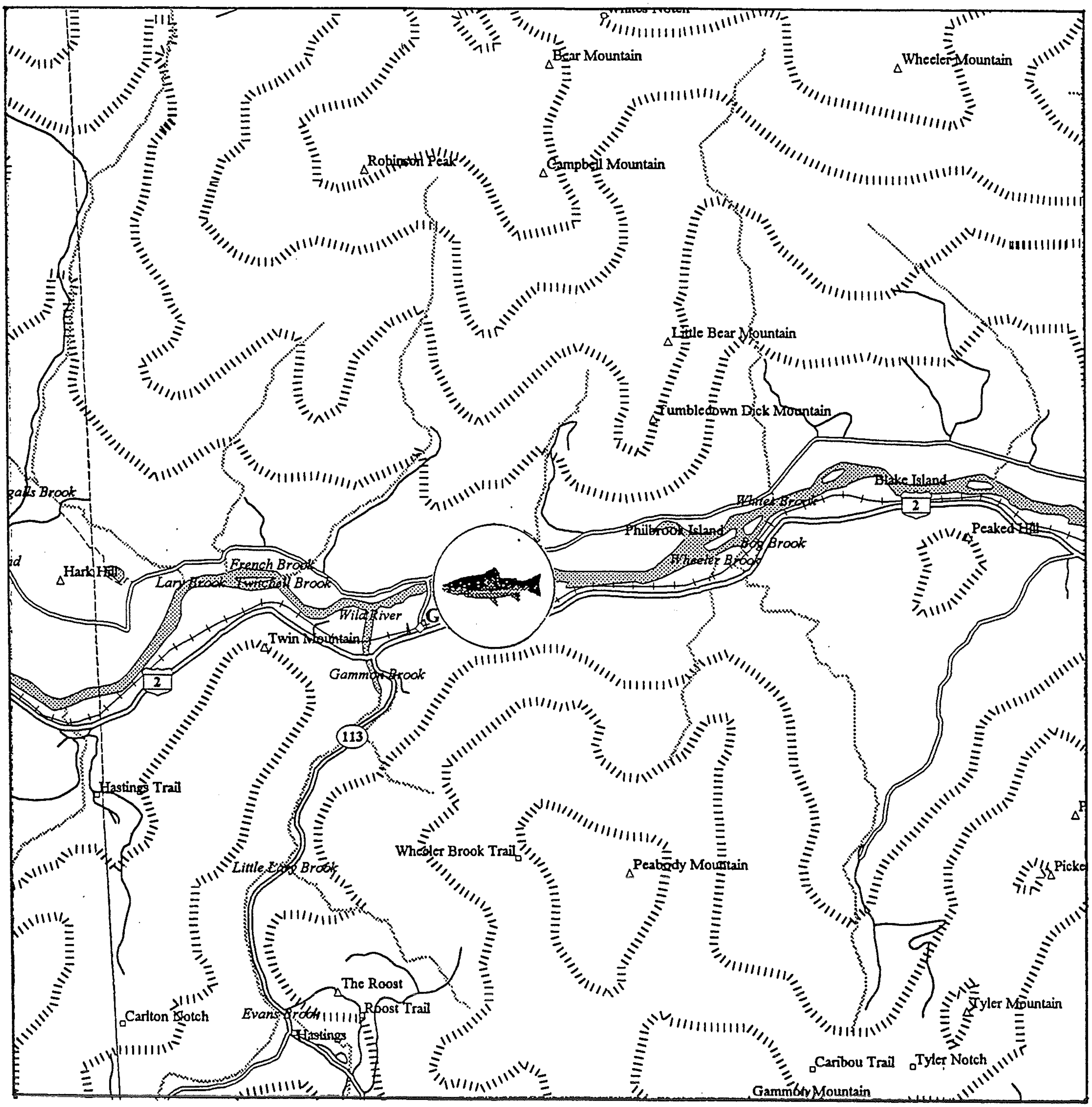
APPENDIX 5. 2378-TCDD AND 2378-TCDF IN SEDIMENTS FROM STATIONS ON THE ANDROSCOGGIN RIVER (pg/g)

LOCATION	DATE	2378-TCDD	2378-TCDF	% MOISTURE	% DOC
Virginia Impoundment Rumford N443147 W703217	910308	4.4	185		2.35
Riley Impoundment Jay N443002 W701458	910306	5.3	168		3.31
Otis Impoundment Livermore Falls N442846 W701213	910327	E6.8	162		2.85
Gulf Island Pond Turner N441520 W701050	850711	23.1			
Gulf Island Pond Turner N441420 W701125	850711	30.3			
Gulf Island Pond Turner N441225 W701210	850711	20.4			
Gulf Island Pond Greene N441040 W701240	850711	39.5 42.6dup			
Gulf Island Pond Greene N440932 W701222	910313	27.4	371		6.79
Worumbo Impound. Lisbon Falls N435950 W700405	910327	4.7	64.2		2.31
Brunswick below dam N435445 W695550	850711	2.5			
Brunswick Cow Island N435520 W695745	850711	1.7			

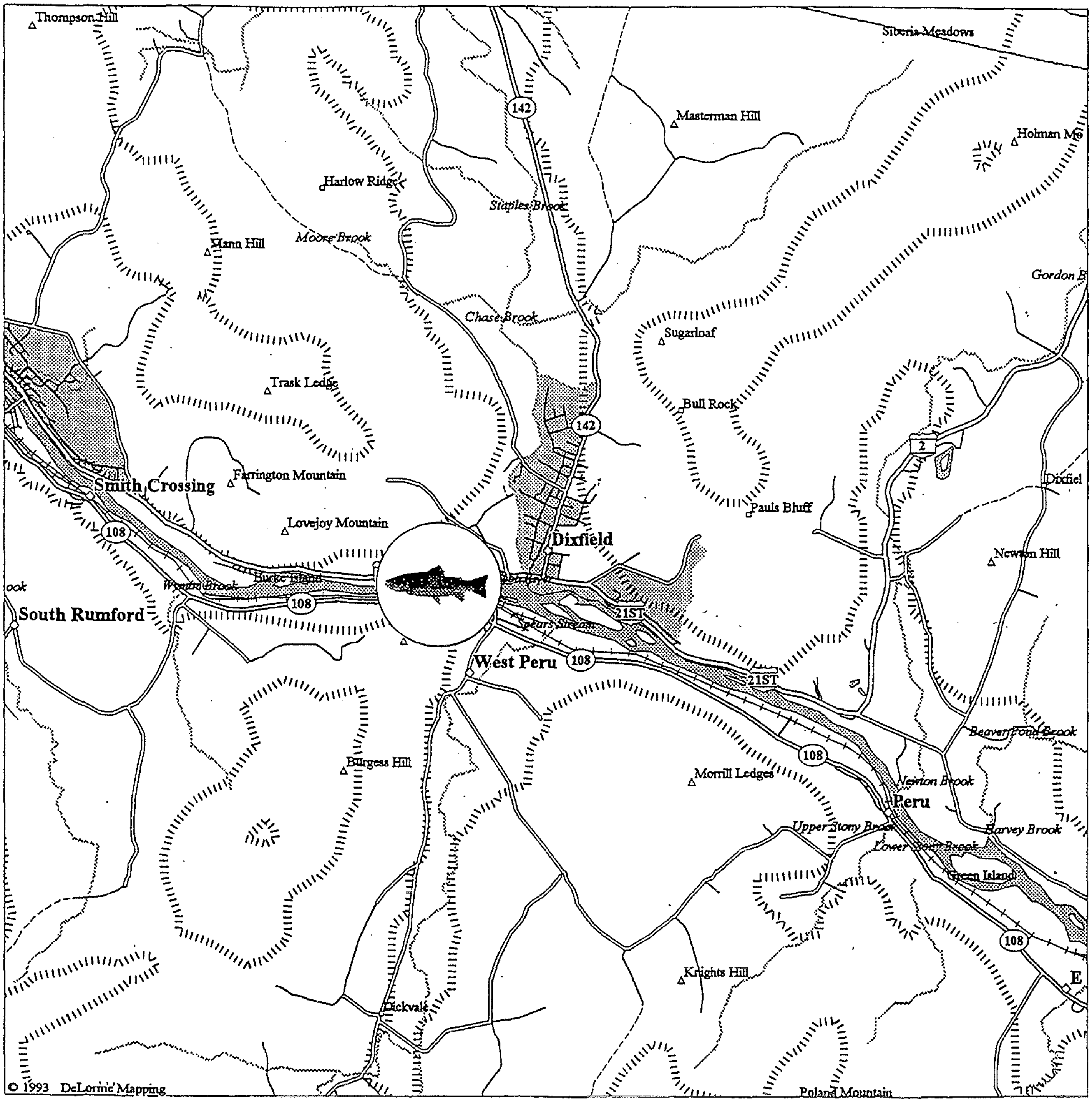
APPENDIX 6

SAMPLE LOCATION MAPS

AGL ANDROSCOGGIN RIVER AT GILEAD

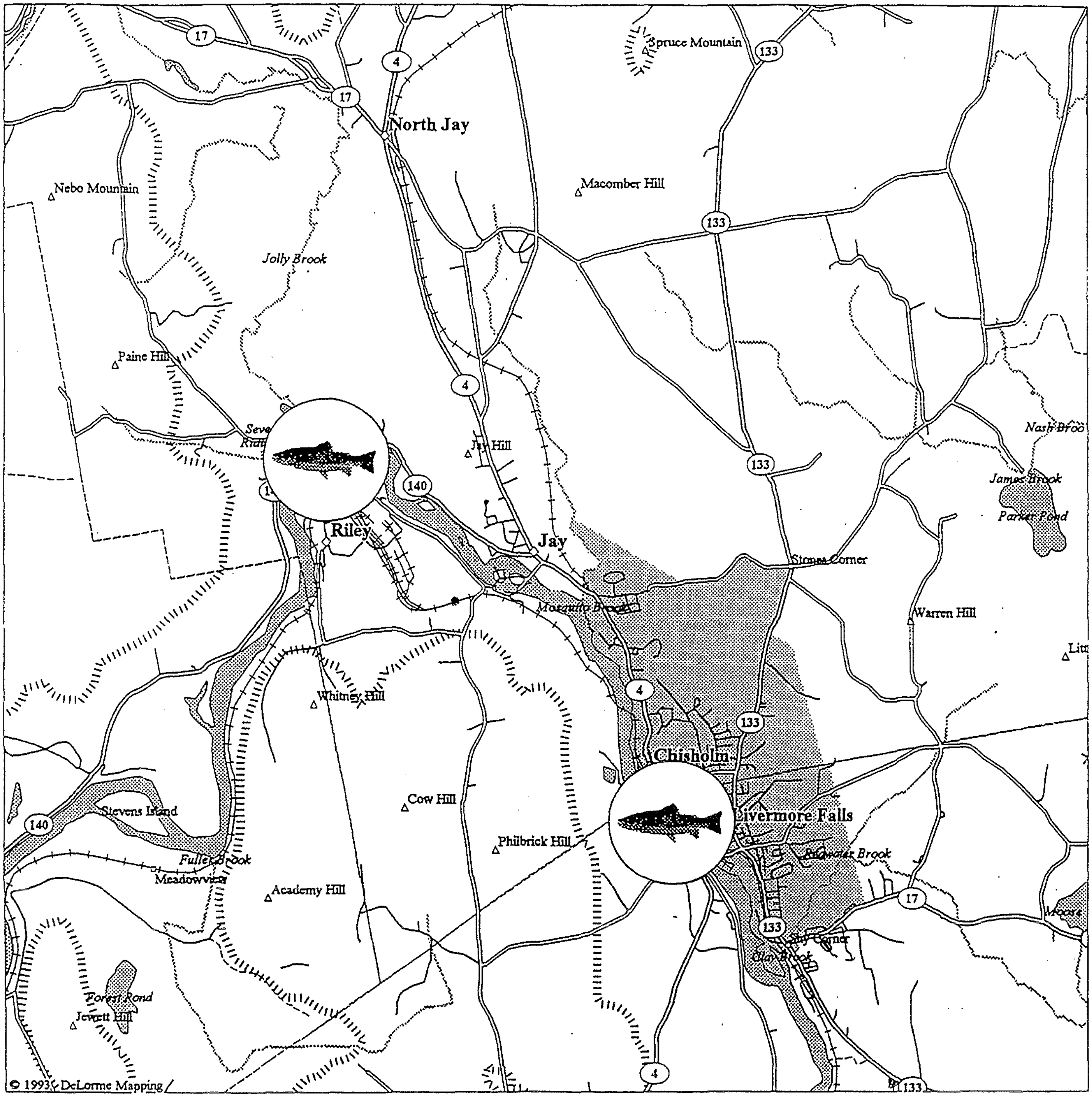


ARF ANDROSCOGGIN RIVER AT RUMFORD

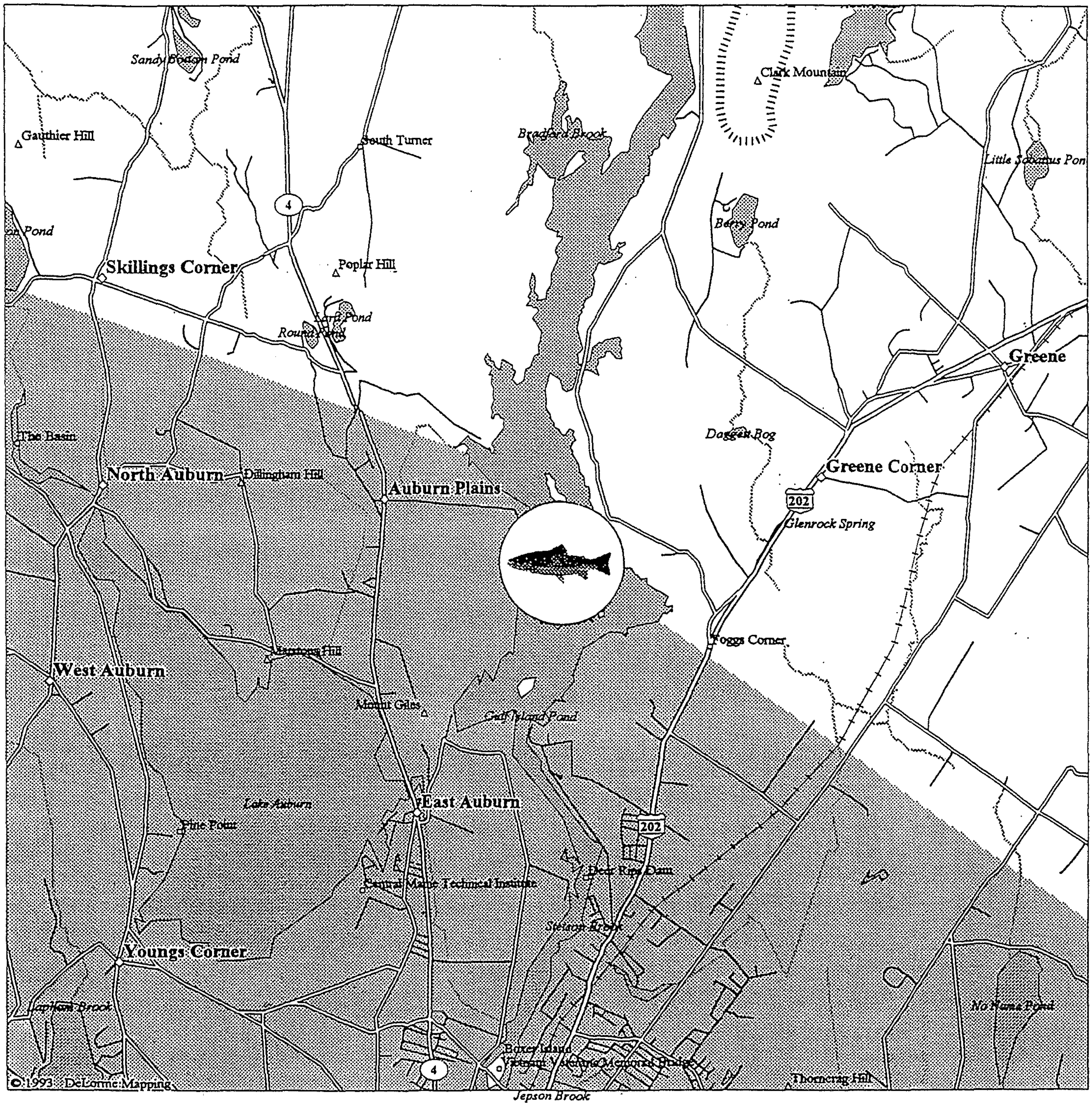


AJY ANDROSCOGGIN RIVER AT JAY

ALV ANDROSCOGGIN RIVER AT LIVERMORE FALLS

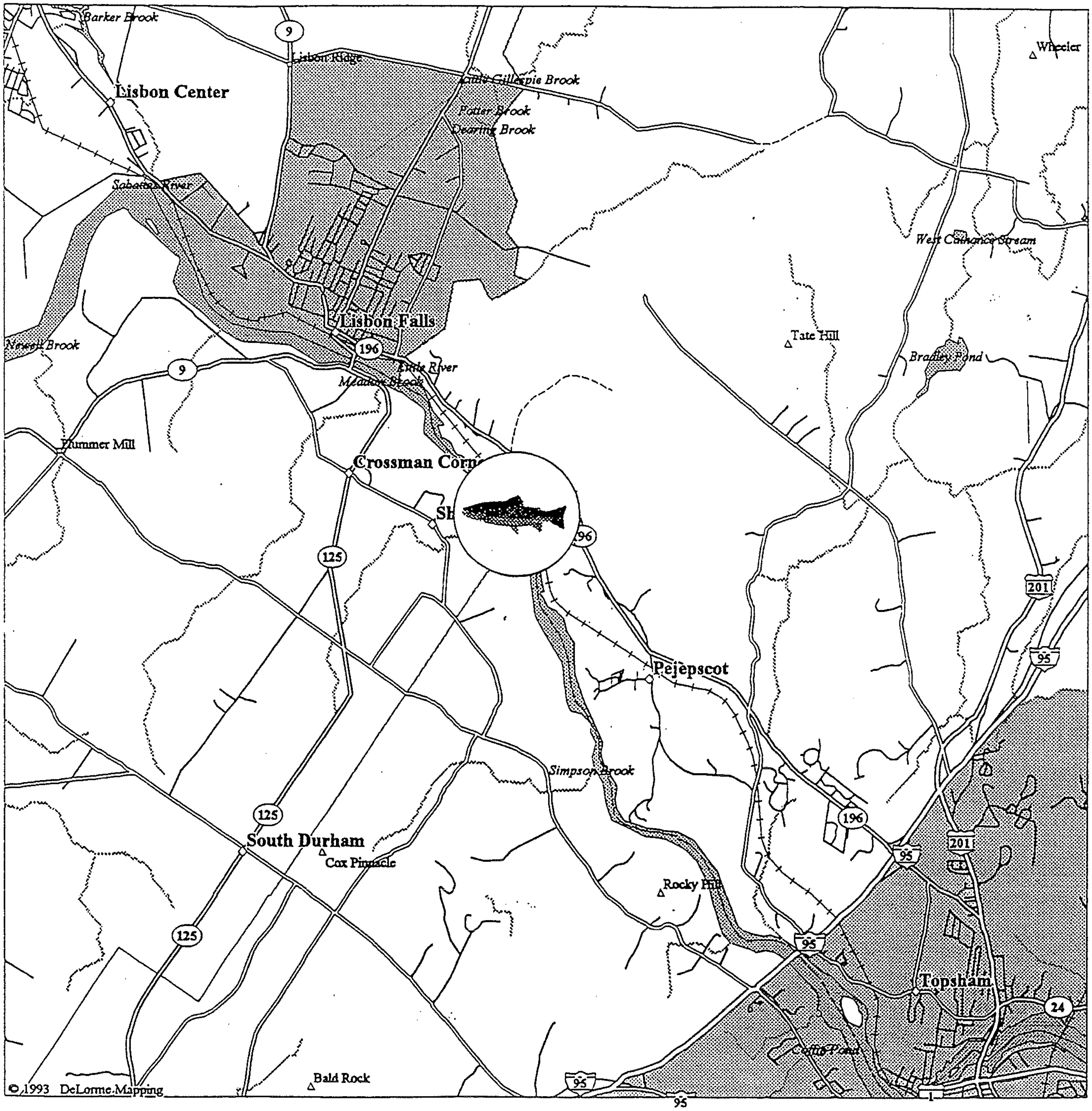


AGI ANDROSCOGGIN RIVER AT GULF ISLAND POND, AUBURN



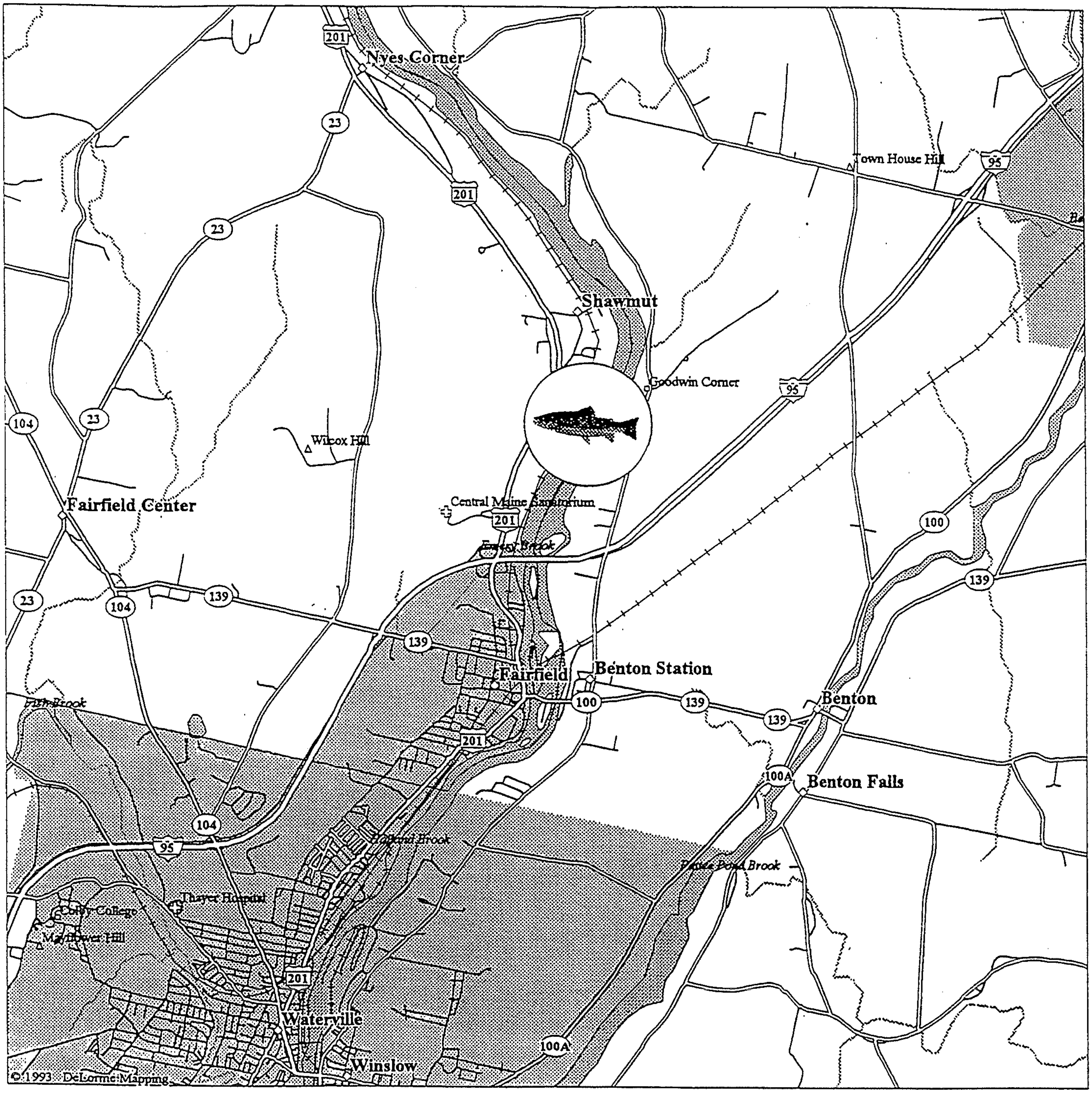
ALS

ANDROSCOGGIN RIVER AT LISBON FALLS

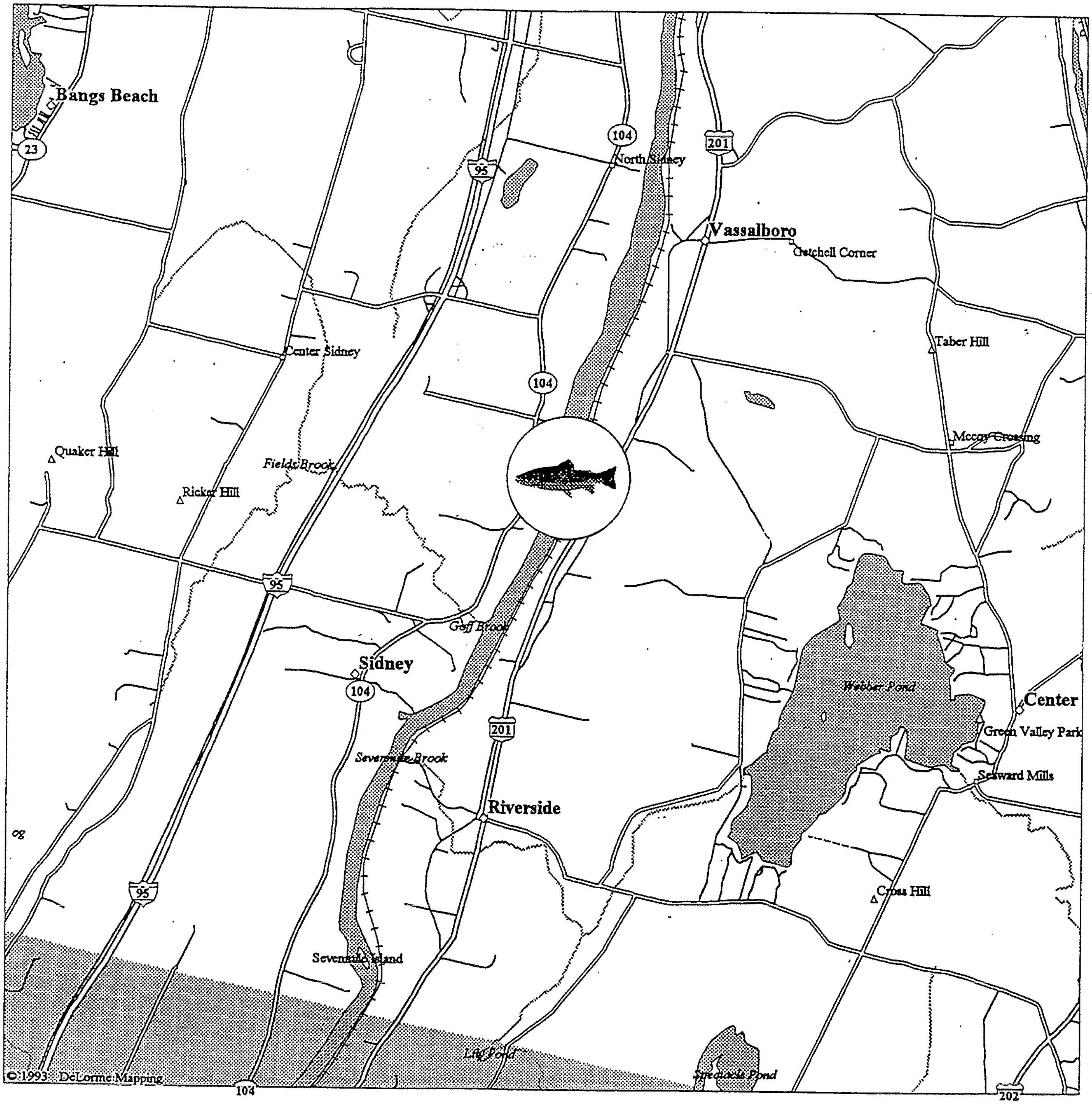


KMD KENNEBEC RIVER AT MADISON

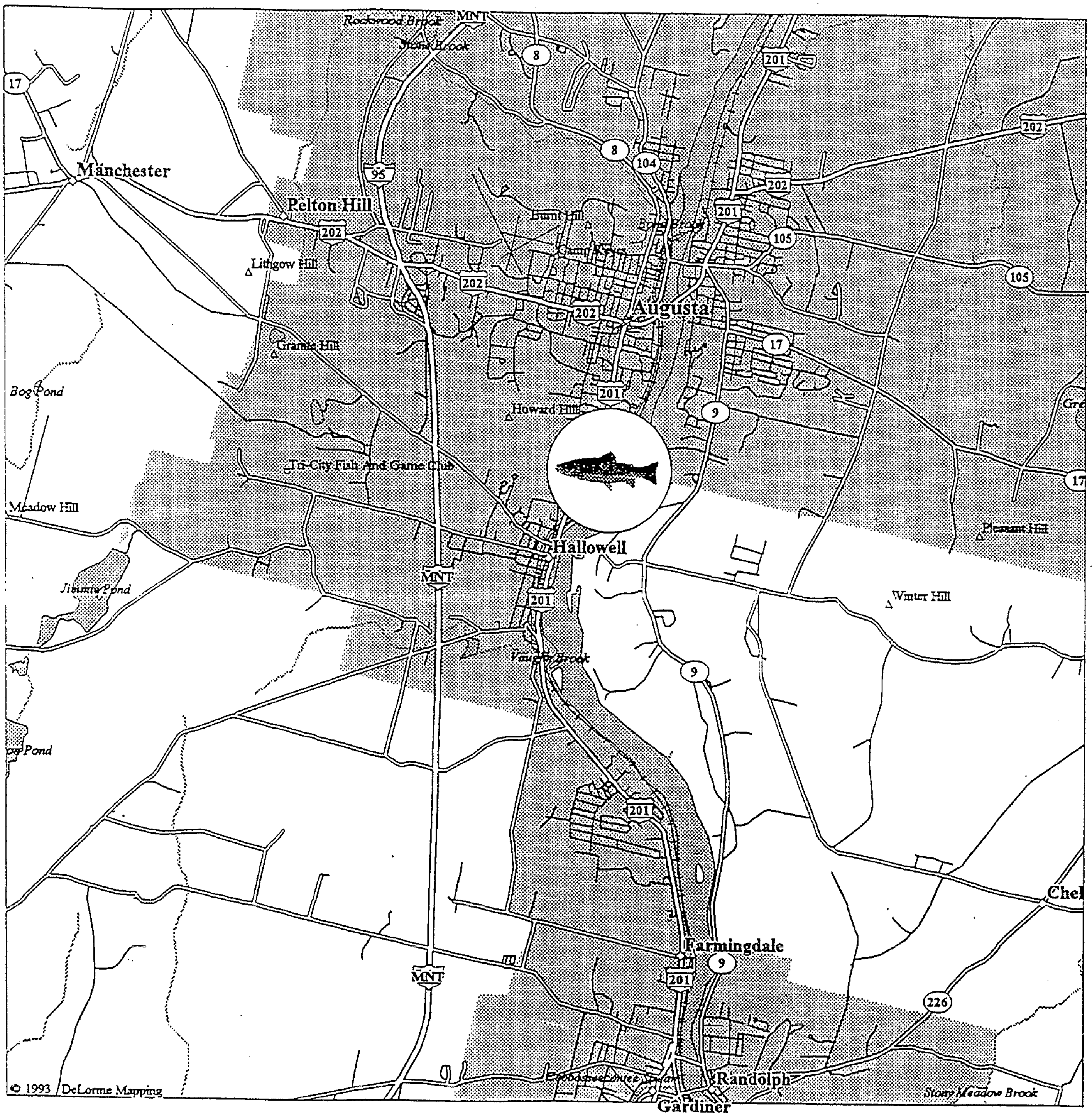
KFF KENNEBEC RIVER AT SHAWMUT, FAIRFIELD



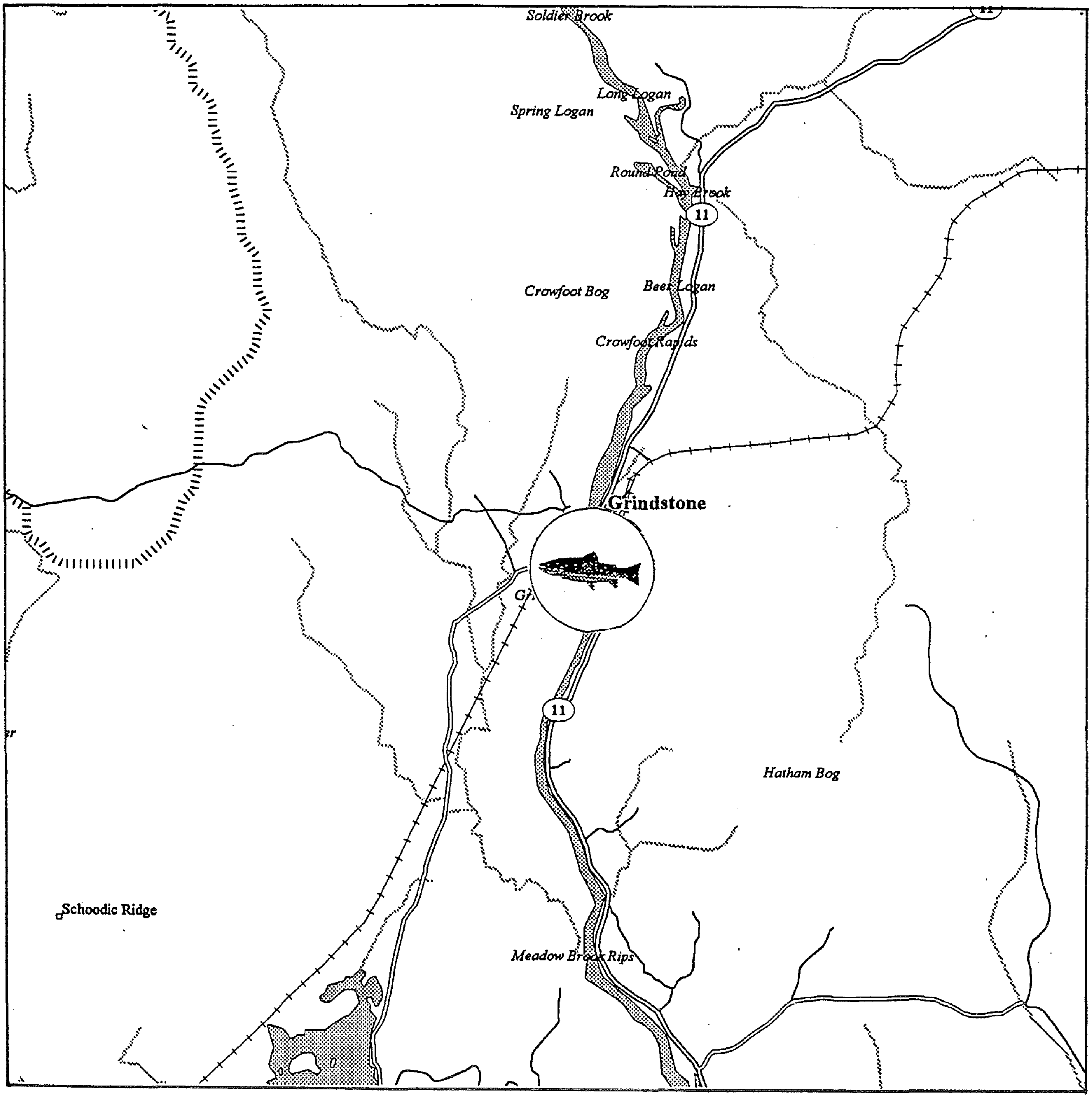
KSD KENNEBEC RIVER AT SIDNEY



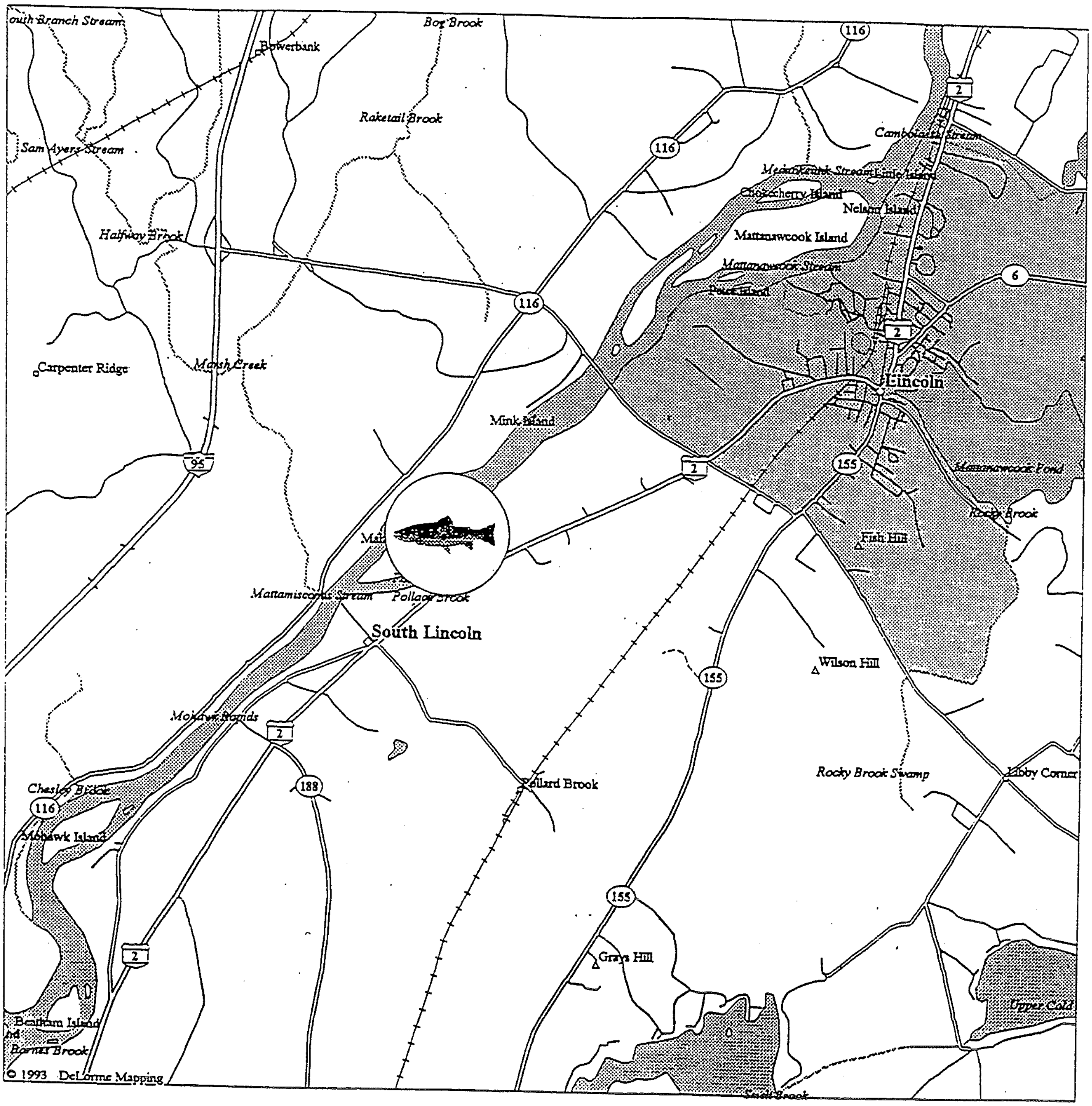
KAG KENNEBEC RIVER AT AUGUSTA



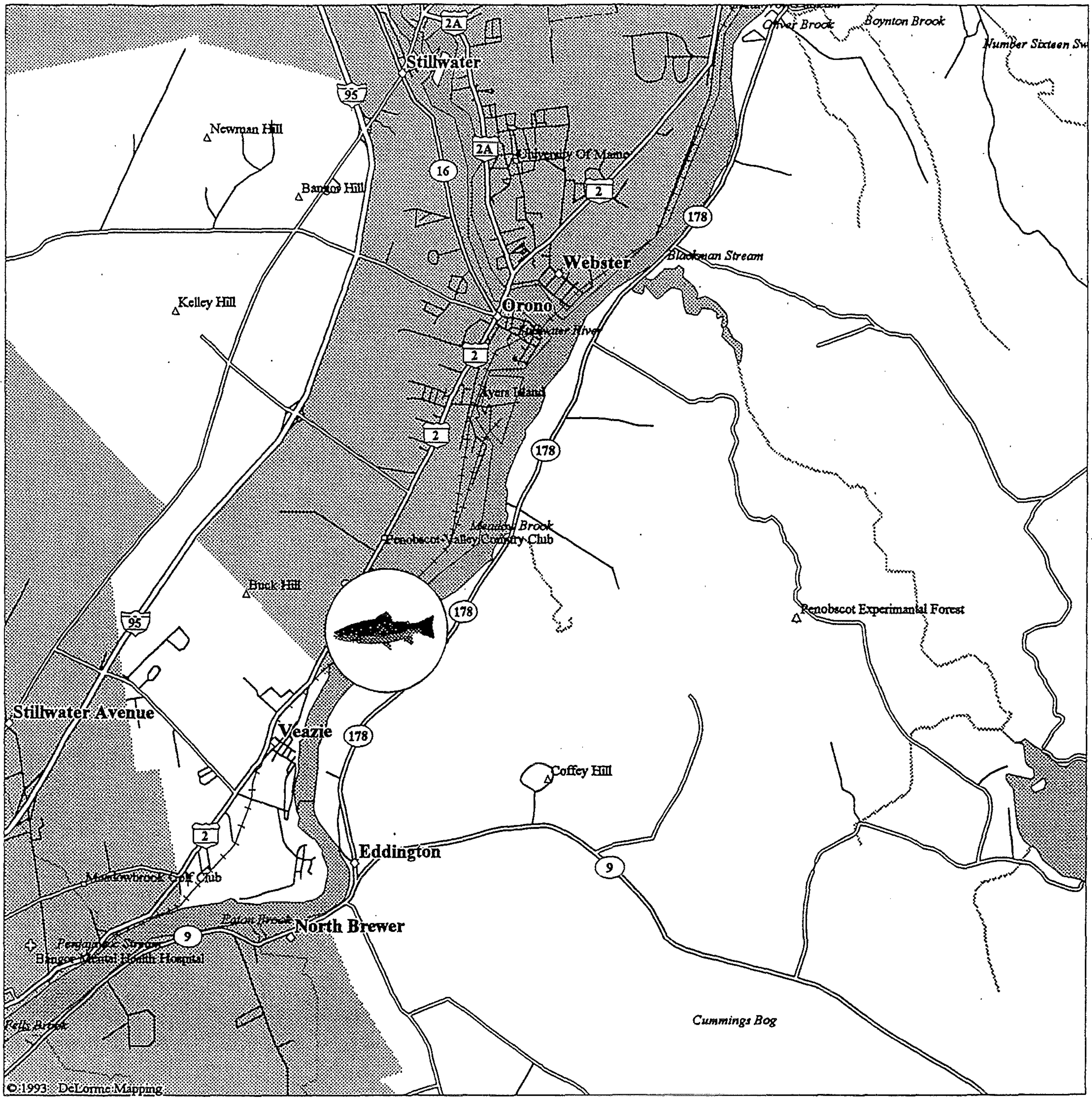
PBG PENOBSCOT RIVER AT GRINDSTONE



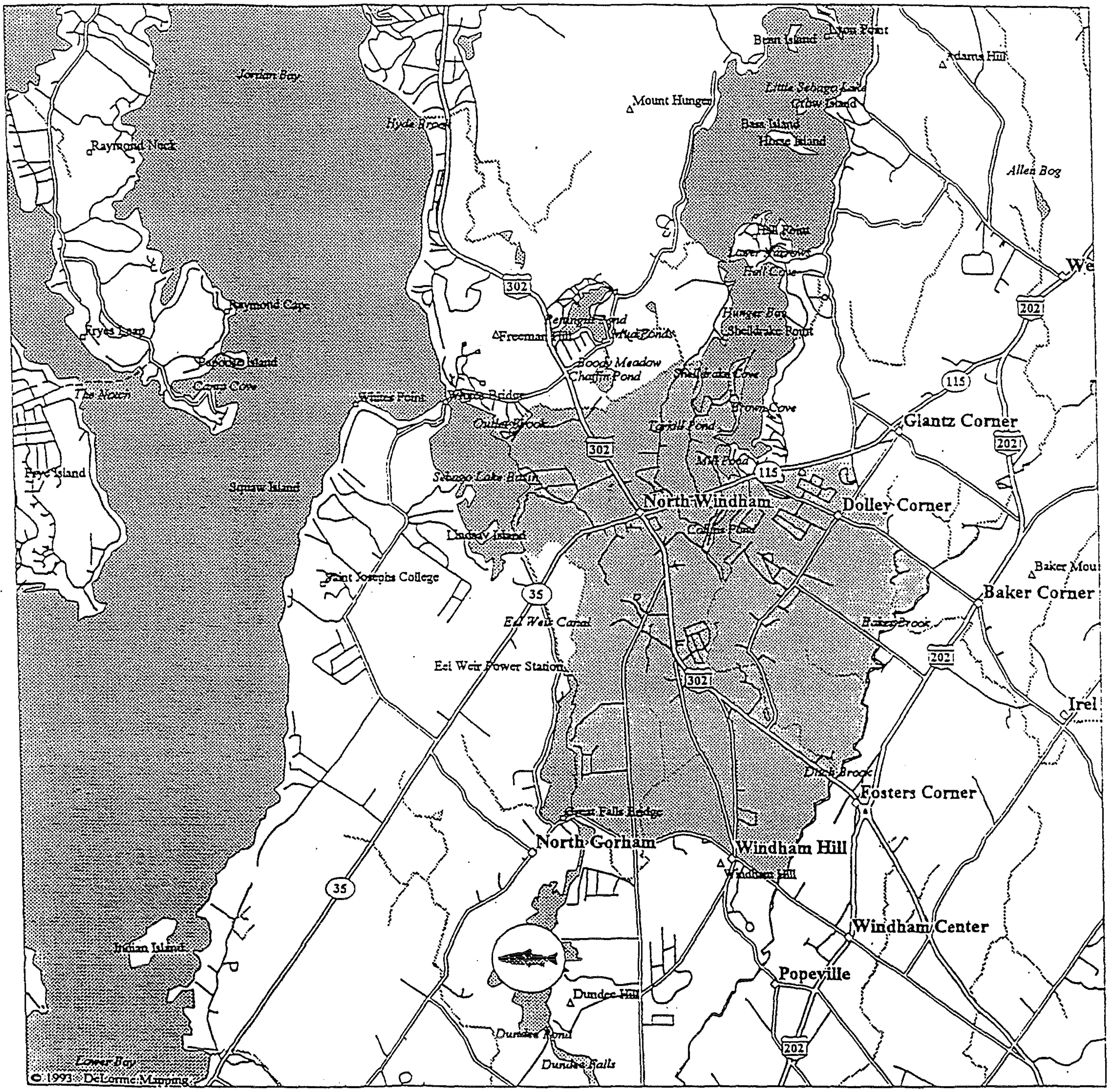
PBL PENOBSCOT RIVER AT SOUTH LINCOLN



PBV PENOBSCOT RIVER AT VEAZIE

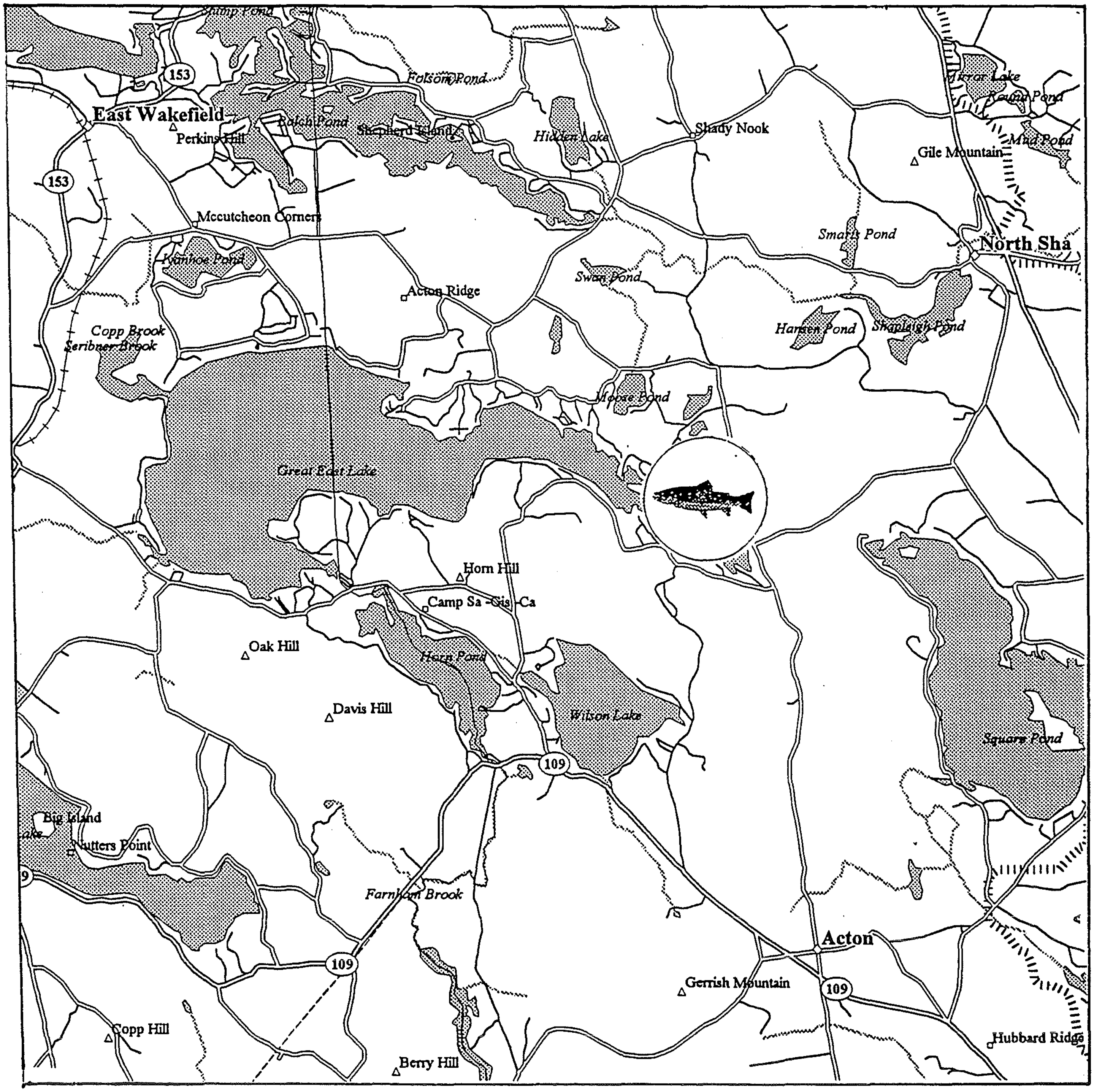


PWD PRESUMPSCOT RIVER AT WINDHAM



PWB PRESUMPSCOT RIVER AT WESTBROOK

SFA SALMON FALLS RIVER AT ACTON

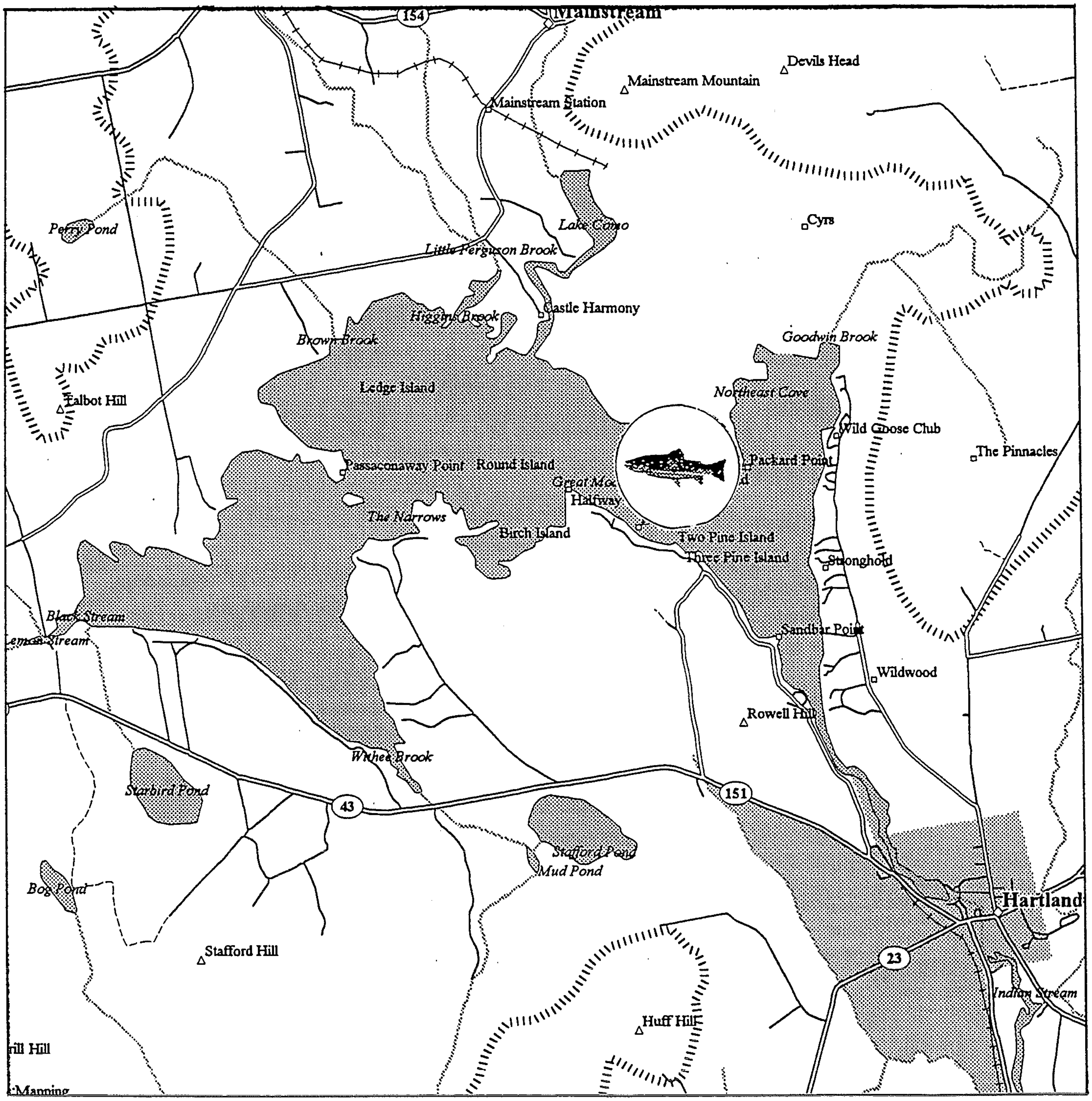


SFS SALMON FALLS RIVER AT SOUTH BERWICK

SEN E.BR.SEBASTICOOK RIVER AT NEWPORT

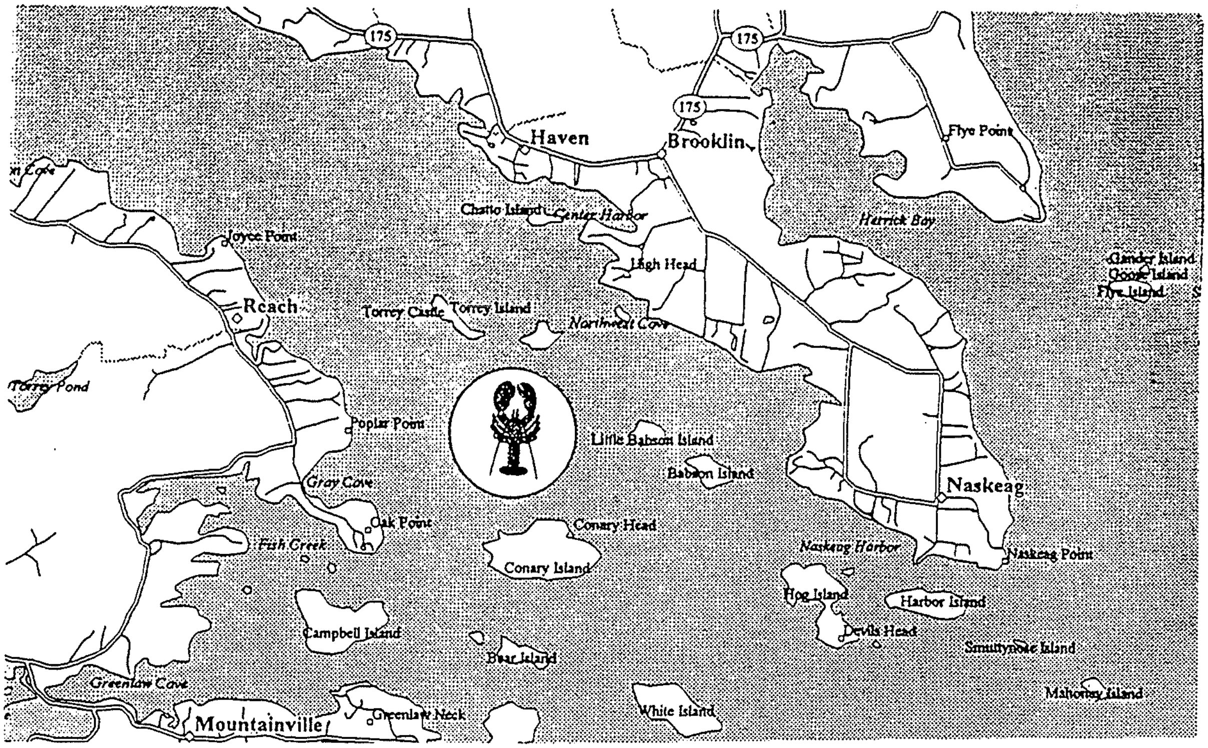
SEC E.BR.SEBASTICOOK R. AT CORINA

SWH W.BR.SEBASTICOOK RIVER AT HARTLAND

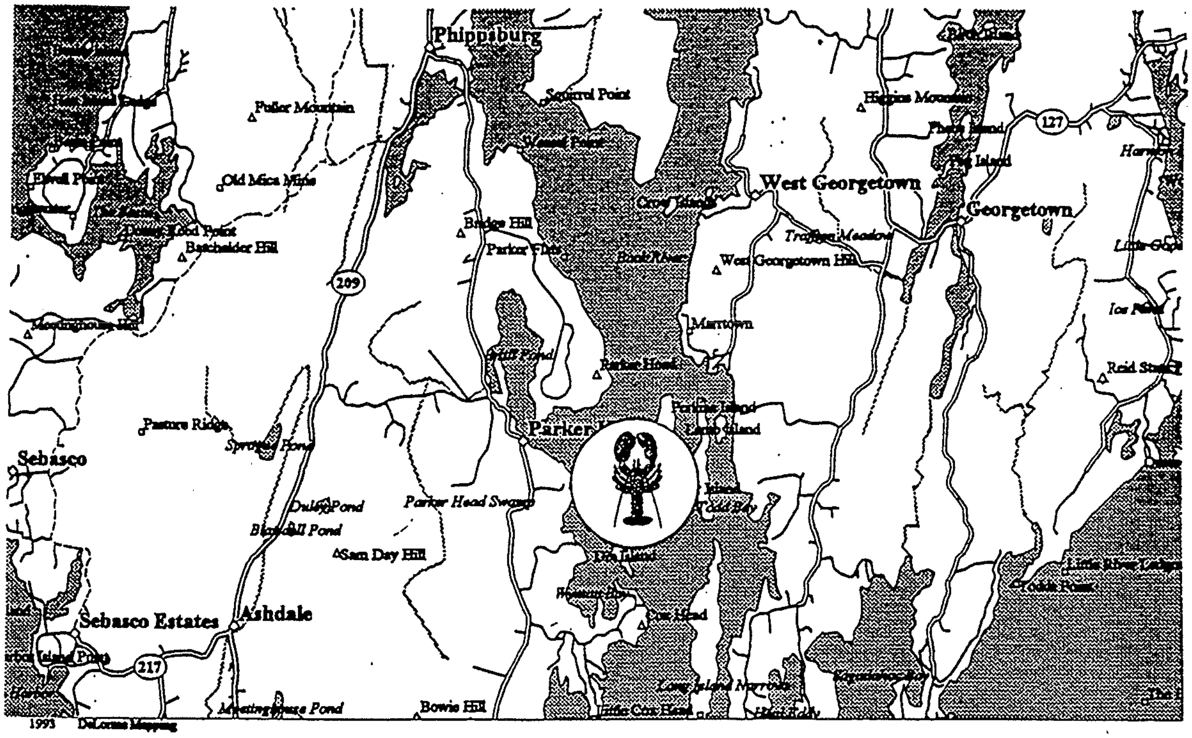


SWP W BR SEBASTICOOK RIVER AT PALMYRA

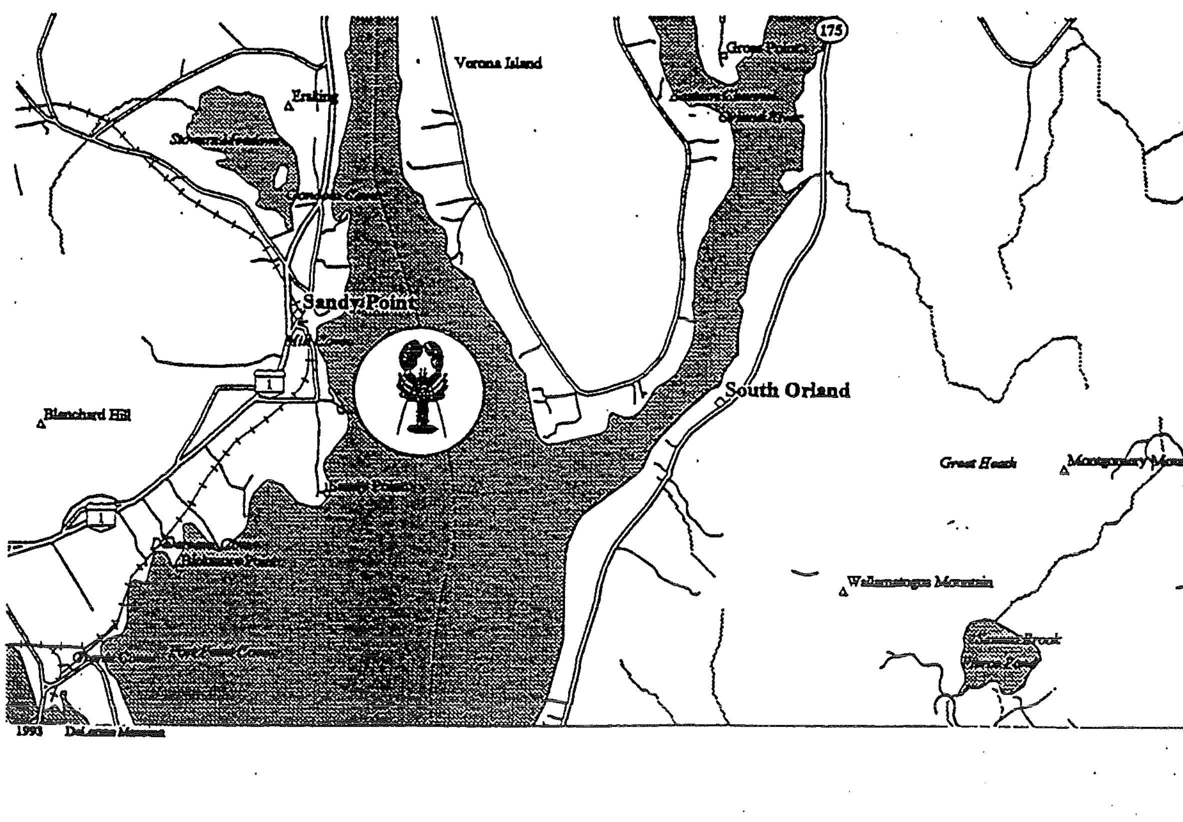
ERB EGGEMOGGIN REACH
BROOKLIN



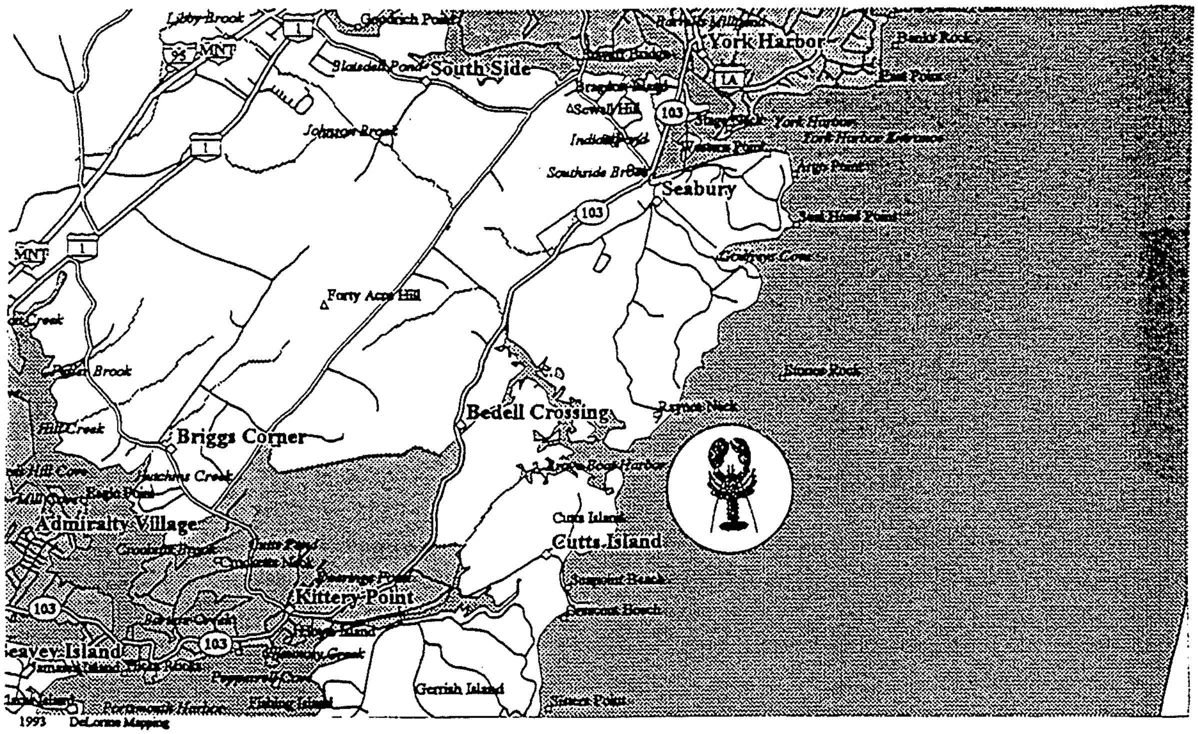
KRP LOWER KENNEBEC ESTUARY
PHIPPSBURG - GEORGETOWN



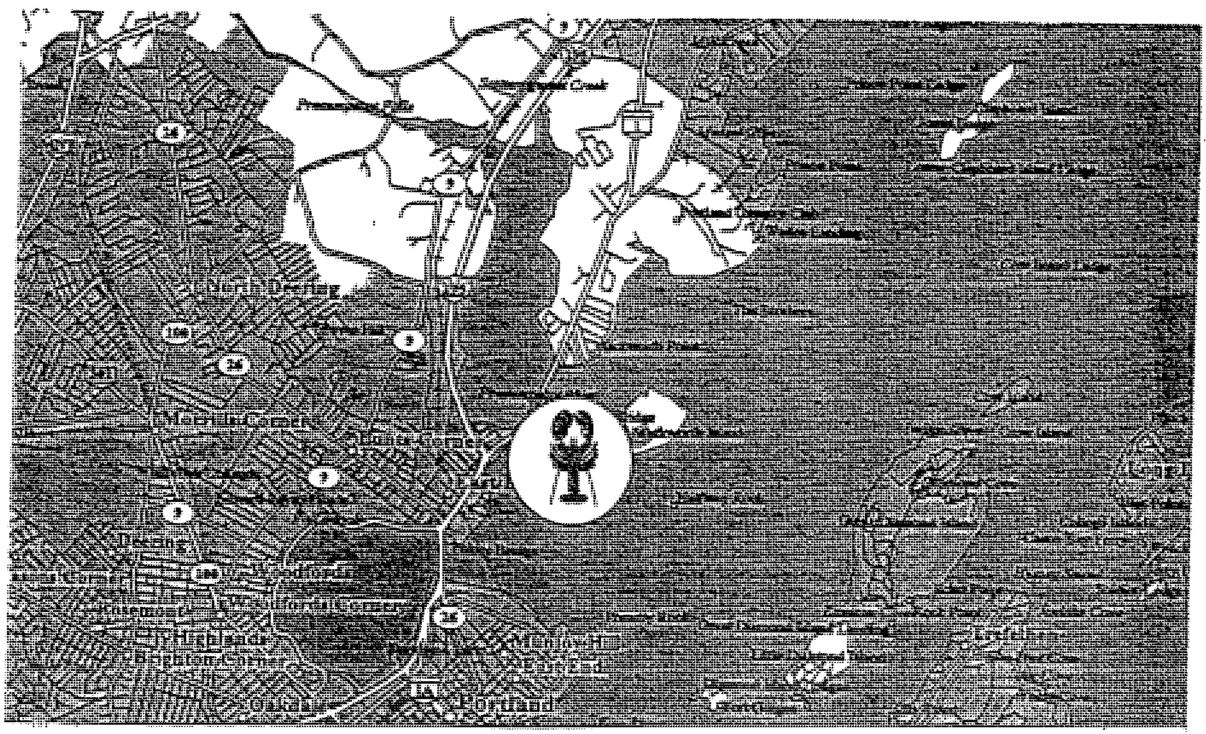
PBS UPPER PENOBSCOT ESTUARY
VERONA



BBK BRAVE BOAT HARBOR
KITTERY - YORK



PRP OUTER PRESUMPSCOT ESTUARY
PORTLAND



APPENDIX 7

LENGTHS, WEIGHTS, AND PERCENT LIPID

IN 1995 FISH SAMPLES

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
ANDROSCOGGIN RIVER					
Gilead					**AGL-SMB-COMP**
AGL-SMB-01	7/10/95	231	190	540.00	1
AGL-SMB-02	7/10/95	221	200	540.00	1
mean		**226**	**195**	**540.00**	
					AGL-RBT-COMP
AGL-RBT-01	9/26/95	394		3.80	1
AGL-RBT-02	10/16/95	401	675	3.80	1
mean		**398**	**675**	**3.80**	
					AGL-WHS-COMP
AGL-WHS-01	7/10/95	394	650	8.30	2
AGL-WHS-02	7/10/95	381	600	9.20	1
AGL-WHS-03	7/10/95	417	750	8.30	2
AGL-WHS-04	7/10/95	343	352	9.20	1
AGL-WHS-05	7/10/95	389	680	8.30	2
AGL-WHS-06	7/10/95	399	752	8.30	2
AGL-WHS-07	7/11/95	381	600	9.20	1
AGL-WHS-08	7/11/95	429	840	8.30	2
AGL-WHS-09	7/12/95	363	540	9.20	1
AGL-WHS-10	7/12/95	381	690	9.20	1
mean		**388**	**645**	**8.75**	
Rumford					**ARF-SMB-COMP**
ARF-SMB-01	7/13/95	406	1200	2.90	5
ARF-SMB-02	7/13/95	411	1050	2.60	4
ARF-SMB-03	7/13/95	399	1050	2.90	5
ARF-SMB-04	7/13/95	267	290	2.20	1
ARF-SMB-05	7/13/95	368	720	1.80	3
ARF-SMB-06	7/13/95	356	720	1.60	2
ARF-SMB-07	7/13/95	335	620	1.80	3
ARF-SMB-08	7/13/95	353	700	2.60	4
ARF-SMB-09	7/13/95	287	340	1.60	2
ARF-SMB-10	7/13/95	297	440	2.20	1
mean		**348**	**713**	**2.22**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Jay					**AJY-WHS-COMP**
AJY-WHS-01	8/11/95	419	680	8.00	1
AJY-WHS-02	8/11/95	394	670	8.00	1
AJY-WHS-03	8/11/95	391	650	8.00	1
AJY-WHS-04	8/11/95	399	770	8.70	2
AJY-WHS-05	8/11/95	427	870	8.70	2
AJY-WHS-06	8/11/95	450	890	8.70	2
AJY-WHS-07	8/11/95	394	650	8.00	1
AJY-WHS-08	8/11/95	419	700	8.70	2
AJY-WHS-09	8/11/95	394	520	8.00	1
AJY-WHS-10	8/11/95	414	770	8.70	2
mean		**410**	**717**	**8.35**	
Livermore falls					**ARV-SMB-COMP**
ALV-SMB-01	8/11/95	312	425	1.11	2
ALV-SMB-02	8/11/95	333	480	2.43	3
ALV-SMB-03	8/11/95	343	520	0.75	4
ALV-SMB-04	8/11/95	333	490	2.43	3
ALV-SMB-05	8/11/95	287	330	0.58	1
ALV-SMB-06	8/11/95	325	440	1.11	2
ALV-SMB-07	8/11/95	274	310	0.58	1
ALV-SMB-08	8/11/95	373	820	0.75	4
ALV-SMB-09	8/11/95	419	1000	0.73	5
ALV-SMB-10	8/11/95	422	990	0.73	5
mean		**342**	**581**	**1.12**	
Auburn					**AGI-WHS-COMP**
AGI-WHS-01	7/18/95	310	325	16.50	1
AGI-WHS-02	7/18/95	371	475	15.80	2
AGI-WHS-03	7/18/95	234	170	16.50	1
AGI-WHS-04	7/18/95	323	385	15.80	2
AGI-WHS-05	7/18/95	226	120	16.50	1
AGI-WHS-06	7/18/95	315	375	15.80	2
AGI-WHS-07	7/18/95	384	565	15.80	2
AGI-WHS-08	7/18/95	264	280	16.50	1
AGI-WHS-09	7/18/95	323	400	15.80	2
AGI-WHS-10	7/18/95	267	250	16.50	1
mean		**301**	**335**	**16.15**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Lisbon Falls					**ALS-SMB-COMP**
ALS-SMB-01	8/28/95	318	420	2.71	2
ALS-SMB-02	8/28/95	384	700	2.35	5
ALS-SMB-03	8/28/95	353	560	1.21	4
ALS-SMB-04	8/28/95	305	400	3.13	3
ALS-SMB-05	8/28/95	356	560	1.21	4
ALS-SMB-06	8/28/95	320	420	1.65	1
ALS-SMB-07	8/28/95	399	820	2.35	5
ALS-SMB-08	8/28/95	295	340	2.71	2
ALS-SMB-09	8/28/95	356	600	3.13	3
ALS-SMB-10	8/28/95	310	380	1.65	1
mean		**339**	**520**	**2.21**	
Madison					**KMD-BNT-COMP**
KMD-BNT-01	1995	420	1200	0.27	1
KMD-BNT-02	1995	390	900	0.49	2
KMD-BNT-03	1995	550	1900	0.59	3
mean		**453**	**1333**	**0.45**	
					KMD-WHS-COMP
KMD-WHS-01	7/19/95	384	700	1.32	2
KMD-WHS-02	7/19/95	351	490	0.99	1
KMD-WHS-03	7/19/95	384	580	0.99	1
KMD-WHS-04	7/19/95	307	310	0.99	1
KMD-WHS-05	7/19/95	442	805	1.32	2
KMD-WHS-06	7/19/95	424	952	1.32	2
KMD-WHS-07	7/19/95	394	748	1.32	2
KMD-WHS-08	7/19/95	429	900	1.32	2
KMD-WHS-09	7/19/95	325	380	0.99	1
KMD-WHS-10	7/19/95	381	655	0.99	1
mean		**382**	**652**	**1.16**	
Fairfield					**KFF-BNT-COMP**
KFF-BNT-01	6/16/95	500	1360	1.18	3
KFF-BNT-02	6/17/95	495	1250	1.19	2
KFF-BNT-03	6/17/95	487	1220	1.51	1
KFF-BNT-04	6/17/95	395	730	1.51	1
KFF-BNT-05	6/24/95	502	1420	1.70	4
KFF-BNT-06	6/24/95	514	1350	1.37	5
KFF-BNT-07	7/3/95	483	1320	1.70	4
KFF-BNT-08	7/3/95	450	1100	1.19	2
KFF-BNT-09	7/3/95	510	1220	1.18	3
KFF-BNT-10	7/3/95	475	1460	1.37	5
mean		**481**	**1243**	**1.39**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Augusta					**KAG-BNT-COMP**
KAG-BNT-01	7/21/95	414	950	1.61	1
KAG-BNT-02	7/21/95	467	1200	1.22	2
KAG-BNT-03	7/21/95	452	1125	1.22	2
KAG-BNT-04	7/21/95	470	1151	1.06	3
KAG-BNT-05	7/21/95	467	1120	1.61	1
KAG-BNT-06	7/21/95	511	1610	3.31	4
KAG-BNT-07	7/21/95	411	850	3.31	4
KAG-BNT-08	7/21/95	472	1340	1.06	3
KAG-BNT-09	7/21/95	554	1625	4.22	5
KAG-BNT-10	7/21/95	533	1900	4.22	5
mean		**475**	**1287**	**2.28**	
PENOBSCOT RIVER					
Grindstone					**PBG-SMB-COMP**
PBG-SMB-01	8/17/95	390	900	0.49	5
PBG-SMB-02	8/17/95	318	410	0.30	1
PBG-SMB-03	8/17/95	361	670	0.42	4
PBG-SMB-04	8/17/95	354	560	0.21	2
PBG-SMB-05	8/17/95	354	560	0.46	3
PBG-SMB-06	8/17/95	347	480	0.21	2
PBG-SMB-07	8/17/95	341	510	0.46	3
PBG-SMB-08	8/17/95	320	420	0.30	1
PBG-SMB-09	8/17/95	338	540	0.42	4
PBG-SMB-10	8/17/95	342	580	0.49	5
mean		**347**	**563**	**0.38**	
Grindstone					**PBG-WHS-COMP**
PBG-WHS-01	8/17/95	405	780	0.53	1
PBG-WHS-02	8/17/95	435	960	0.53	1
PBG-WHS-03	8/17/95	445	1050	0.53	1
PBG-WHS-04	8/17/95	430	905	0.53	1
PBG-WHS-05	8/17/95	460	1000	0.53	1
PBG-WHS-06	8/17/95	442	770	0.71	2
PBG-WHS-07	8/17/95	460	880	0.71	2
PBG-WHS-08	8/18/95	412	840	0.71	2
PBG-WHS-09	8/18/95	433	830	0.71	2
PBG-WHS-10	8/18/95	386	710	0.71	2
mean		**431**	**873**	**0.62**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Lincoln					**PBL-WHS-COMP**
PBL-SMB-01	8/18/95	331	470	1.42	3
PBL-SMB-02	8/18/95	324	440	1.14	2
PBL-SMB-03	8/18/95	296	340	2.24	1
PBL-SMB-04	8/18/95	321	420	1.14	2
PBL-SMB-05	8/18/95	305	390	2.24	1
PBL-SMB-06	8/18/95	350	500	1.42	3
PBL-SMB-07	8/18/95	337	500	1.42	4
PBL-SMB-08	8/18/95	397	840	3.02	5
PBL-SMB-09	8/18/95	402	860	1.42	4
PBL-SMB-10	8/18/95	438	1010	3.02	5
mean		**350**	**577**	**1.85**	
Veazie					**PBV-SMB-COMP**
PBV-SMB-01	8/22/95	290	275	0.96	2
PBV-SMB-02	8/22/95	297	320	0.83	1
PBV-SMB-03	8/22/95	343	470	1.79	5
PBV-SMB-04	8/22/95	366	570	1.79	5
PBV-SMB-05	8/22/95	318	380	0.96	2
PBV-SMB-06	8/22/95	305	315	0.93	3
PBV-SMB-07	8/22/95	292	300	0.93	3
PBV-SMB-08	8/22/95	305	340	0.83	1
PBV-SMB-09	8/23/95	305	370	0.96	4
PBV-SMB-10	8/23/95	315	350	0.96	4
mean		**313**	**369**	**1.09**	
					PBV-WHS-COMP
PBV-WHS-01	8/23/95	11.7	300	5.60	1
PBV-WHS-02	8/23/95	10.4	185	5.60	1
PBV-WHS-03	8/23/95	11.5	245	5.60	1
PBV-WHS-04	8/23/95	13.4	435	12.30	2
PBV-WHS-05	8/24/95	14.5	665	12.30	2
PBV-WHS-06	8/24/95	12	400	12.30	2
PBV-WHS-07	8/24/95	14.6	622	12.30	2
PBV-WHS-08	8/24/95	14.8	640	12.30	2
PBV-WHS-09	8/24/95	11	270	5.60	1
PBV-WHS-10	8/25/95	12.1	360	5.60	1
mean		**12.6**	**412.2**	**8.95**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Windham					**PWD-WHS-COMP**
PWD-WHS-01	8/8/95	551	1850	4.97	1
PWD-WHS-02	8/8/95	462	1321	4.97	1
PWD-WHS-03	8/8/95	396	700	4.47	2
PWD-WHS-04	8/8/95	505	1325	4.97	1
PWD-WHS-05	8/8/95	493	1190	4.47	2
PWD-WHS-06	8/8/95	462	1120	4.97	1
PWD-WHS-07	8/8/95	445	1000	4.47	2
PWD-WHS-08	8/8/95	460	910	4.47	2
PWD-WHS-09	8/8/95	518	1380	4.47	2
mean		**477**	**1200**	**4.69**	
Westbrook					**PWB-WHS-COMP**
PWB-WHS-01	8/9/95	427	1000	8.27	1
PWB-WHS-02	8/10/95	381	760	8.27	1
PWB-WHS-03	8/10/95	353	720	8.27	1
PWB-WHS-04	8/10/95	399	880	8.27	1
PWB-WHS-05	8/10/95	409	940	8.27	1
PWB-WHS-06	8/10/95	353	670	8.85	2
PWB-WHS-07	8/10/95	335	500	8.85	2
PWB-WHS-08	8/10/95	312	440	8.85	2
PWB-WHS-09	8/10/95	277	320	8.85	2
PWB-WHS-10	8/10/95	251	250	8.85	2
mean		**350**	**648**	**8.56**	
SALMON FALLS RIVER					
Acton					**SFA-LMB-COMP**
SFA-LMB-01	6/26/95	376	660	0.38	1
SFA-LMB-02	6/27/95	381	770	0.38	1
SFA-LMB-03	6/27/95	279	370	0.35	2
SFA-LMB-04	6/27/95	318	500	0.35	2
SFA-LMB-05	6/27/95	292	315	0.35	2
SFA-LMB-06	6/27/95	310	325	0.35	2
SFA-LMB-07	6/27/95	432	1230	0.38	1
SFA-LMB-08	6/27/95	437	1250	0.38	1
mean		**353**	**678**	**0.37**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
South Berwick					**SFS-SMB-COMP**
SFS-SMB-01	361	730	730	0.75	2
SFS-SMB-02	284	280	280	0.46	1
SFS-SMB-03	236	140	140	0.46	1
SFS-SMB-04	361	580	580	0.75	2
SFS-SMB-05	269	250	250	0.46	1
SFS-SMB-06	279	230	230	0.46	1
SFS-SMB-07	323	450	450	0.75	2
SFS-SMB-08	315	390	390	0.75	2
mean	**304**	**381**	**381**	**0.61**	
SEBASTICOOK RIVER					
Corina					**SEC-LMB-COMP**
SEC-LMB-01	5/25/95	378	790	0.40	1
SEC-LMB-02	5/25/95	338	560	0.40	1
SEC-LMB-03	5/25/95	442	1250	2.04	2
SEC-LMB-04	5/25/95	338	580	0.40	1
SEC-LMB-05	5/25/95	508	2080	2.04	2
SEC-LMB-06	5/25/95	432	1350	2.04	2
SEC-LMB-07	5/25/95	318	440	0.40	1
SEC-LMB-08	5/26/95	505	2070	2.04	2
SEC-LMB-09	5/26/95	445	1600	2.04	2
SEC-LMB-10	5/26/95	323	460	0.40	1
mean		**403**	**1118**	**1.22**	
Newport					**SEN-LMB-COMP**
SEN-LMB-01	5/23/95	330	500	1.11	1
SEN-LMB-02	5/24/95	437	1150	0.91	2
SEN-LMB-03	5/24/95	419	1190	0.91	2
SEN-LMB-04	5/24/95	399	910	0.91	2
SEN-LMB-05	5/26/95	345	590	1.11	1
SEN-LMB-06	5/26/95	396	960	0.91	2
SEN-LMB-07	5/26/95	348	640	1.11	1
SEN-LMB-08	5/26/95	386	990	1.11	2
mean		**383**	**866**	**1.01**	

Length, weight, and percent lipid of 1995 fish samples

FIELD ID	DATE yymmdd	LENGTH mm	WEIGHT gm	LIPID %	COMPOSITE ID
Hartland					**SWH-SMB-COMP**
SWH-SMB--01	6/23/95	432	1000	0.82	2
SWH-SMB--02	6/23/95	401	915	0.82	2
SWH-SMB--03	6/23/95	399	810	0.32	1
SWH-SMB--04	6/23/95	323	430	0.32	1
SWH-SMB--05	6/23/95	381	750	0.32	1
SWH-SMB--06	6/23/95	381	800	0.32	1
SWH-SMB--07	6/23/95	381	770	0.82	2
SWH-SMB--08	6/23/95	422	845	0.82	2
SWH-SMB--09	6/23/95	340	505	0.32	1
SWH-SMB--10	6/23/95	399	835	0.82	2
mean		**386**	**766**	**0.57**	
Palmyra					**SWP-SMB-COMP**
SWP-SMB-03	6/1/95	305	352	0.09	1
SWP-SMB-04	6/1/95	307	385	0.09	1
SWP-SMB-05	6/1/95	305	365	0.09	1
SWP-SMB-06	6/1/95	325	480	0.09	1
SWP-SMB-07	6/1/95	394	750	0.12	2
SWP-SMB-08	6/1/95	394	815	0.09	1
SWP-SMB-09	6/1/95	432	1025	0.12	2
SWP-SMB-10	6/1/95	432	1005	0.12	2
SWP-SMB-11	10/11/95	406	885	0.12	2
SWP-SMB-12	10/11/95	399	870	0.12	2
mean		**370**	**693**	**0.11**	

APPENDIX 8

SAMPLING SCHEDULE FOR THE 1995 DIOXIN MONITORING PROGRAM

Sampling schedule for the 1995 Dioxin Monitoring Program

May (early stations)

Androscoggin R at Lisbon Falls for brown trout
Kennebec R above Madison for brown trout
Kennebec R at Augusta for brown trout
Kennebec R at Fairfield for brown trout
E Br Sebasticook R at County Rd, Newport for bass/wh perch
W Br Sebasticook R at Rt 2 Palmyra for bass

JULY-AUGUST (all rivers in order, beginning at upstream stations)

Androscoggin R - July
Kennebec R - July
Penobscot R - August
Presumpscot R - August
Salmon Falls R - August
Sebasticook R (East and West Branches) - August

SEPTEMBER (lobsters)

Kennebec R estuary
Machias R estuary
Penobscot R estuary
Presumpscot R estuary
Southern Maine estuary