FINAL

WORK PLAN

Routine Monitoring Program for Toxics in Fish: Estuarine and Marine Waters

JUNE 2004

Co-Project Managers: Gary A. Buchanan, Thomas Belton, and Bruce Ruppel
Division of Science, Research and Technology

New Jersey Department of Environmental Protection

WORK PLAN

Routine Monitoring Program for Toxics in Fish: Estuarine and Marine Waters

I. INTRODUCTION

Fish and shellfish consumption advisories due to toxic chemical contamination were announced in New Jersey in the 1980s and 1990s. Data from Division of Science, Research and Technology (DSRT) studies revealed that unacceptable risks existed for eating certain species of fish and shellfish from certain waters in the State. These advisories particularly apply to pregnant women, nursing mothers and young children because polychlorinated biphenyls (PCBs), dioxin and mercury are known to cause birth defects, developmental problems, neurological problems and/or cancer. However, limited new data has been generated in the past ten years. Therefore, it is not known how appropriate the advisories are today. Current advisories are listed on NJDEP's Website (www.state.nj.us/dep/fgw).

Therefore, new data are needed on a recurring basis to evaluate and adjust advisories as appropriate. Without regular monitoring data, current advisories could be either under or overly protective of human health. The primary objectives of the monitoring program are;

1. To provide current and more comprehensive data on concentrations of toxic contaminants in fish and shellfish in order to assess human health risks and thus update/recommend fish consumption advisories, and
2. To provide data to develop environmental indicators to assess the progress of environmental management actions (See Program Objectives below).

A statewide "Routine Monitoring Program for Toxics in Fish" has been developed. However, the scope of work detailed in this Work Plan covers only 1) the Marine and Estuarine components of the proposed statewide Monitoring Plan (i.e., Year 2 of the plan), and 2) a separate stand-alone investigation of dioxin and other contaminants on the tidal Passaic River and its downstream receiving waters, which will support both the Department's Natural Resource Damage (NRD) claim process as well as its Passaic River Directive.

Note: It is important to add, that a dedicated source of annually renewable funding for the complete "Routine Monitoring Program for Toxics in Fish" (on a rotating five year plan) would be preferable and more protective of public health and natural resources, as well as supplying a continuous means for enforcing State laws affecting the abatement of toxic chemical releases into the waters of the State.

II. OBJECTIVES

The primary goal of the Monitoring Program is to update the human health consumption advisories for certain foodfish species and/or geographic areas. However, NJDEP recognizes the additional potential usages of these data for such important collateral activities as natural

resources management, hazardous site characterization, water quality assessment, natural resource damage claims, and Total Maximum Daily Load (TMDL) development. Where possible, the Monitoring Plan has been designed in cooperation with these Programs and in such a way as to meet the Department's data quality objectives (fish and shellfish collection and analytical techniques) and to maximize benefits for each individual program. The Program Objectives described below outline some of these goals.

Division of Fish and Wildlife

The marine resources in New Jersey support some of the largest recreational and commercial fisheries on the United States Atlantic Coast. On average, about one million recreational anglers spend over 5 million days fishing our marine waters. Each year, recreational marine anglers spend over $750 million resulting in over 20,000 full time equivalent jobs and $45 million in sales tax income to New Jersey. The commercial fishery has approximately 1,900 commercial fishing vessels producing dockside sales of fish, shellfish and crustaceans valued at over $95 million annually. The commercial industry employs approximately 22,000 people in the harvesting, processing and wholesale and retail sales of marine fish and shellfish. The combined value of the commercial and recreational industries to the economy of New Jersey is between $1.5 and $2.1 Billion. These numbers do not include the value that our marine environment and fishing opportunities have on New Jersey's tourist industries. Approximately one-third of all marine-angling participants are non-residents.

Consumption advisories have undoubtedly affected and will continue to affect the quality of the fishing experience and therefore the amount of money spent on fishing in New Jersey. A regular and continuing fish tissue-sampling program will aid in issuing up to date and accurate fish advisories as well as support advisory outreach efforts. A consistent positive message on the benefits of eating seafood along with a fish tissue-sampling program will benefit the recreational and commercial fishing interests in New Jersey.

Measurements of contaminants up the food chain can also assist in assessing ecological as well as human health risks in the region. Monitoring of contaminant levels in piscivorous (fish-eating) birds is planned to determine the magnitude and effects of contaminants at higher trophic levels. Cormorants are common in the harbor and a strict piscivore. Cormorants have wide foraging ranges, however birds tied to a nesting colony have a more localized range. Therefore, eggs and/or blood from nesting colony birds will be targeted for sampling. Samples will be collected from Shooters Island (Newark Bay) and Swinburne Island (Lower Bay). Data will be compared to samples collected by New York State Department of Environmental Conservation (NYSDEC) in 1999.

Office of Natural Resource Restoration (ONRR)

ONRR pursues restoration of injured resources for the citizens of New Jersey. Having accurate fish tissue data will enable ONRR to effectively prioritize damage assessment of watershed specific fishery resources. Accurate and up to date sampling results will also aid in producing legally and scientifically defensible damage assessments. This will further the cause for DEP to fully realize its natural resource trustee obligation under existing statutes. ONRR supports the current proposal and would find it beneficial if the scope of the proposal were expanded into additional watersheds, targeted additional fish species and include waterfowl sampling.

Settlement monies recovered due to lost fishery resources will be returned to the public through primary and/or secondary restoration projects. These projects will have a nexus to the injury and will focus on improving the fishery resources that have been damaged.

Water Monitoring and Standards

The Bureau of Water Quality Standards and Assessment is responsible for water quality characterization and assessment of all waters of the State. Section 305(b) of the Federal Clean Water Act requires states to periodically (every two years) assess and report on the overall quality of their waters. These assessments are reported through the New Jersey Integrated Water Quality Monitoring and Assessment Report (305(b) and 303(d)). Section 303(d) requires states to identify "Impaired Waters" where specific designated uses are not fully supported (See Appendix B). For these waters, the state is required to establish total maximum daily loads (TMDLs) in accordance with a priority ranking.

Marine Water Monitoring has indicated a need to collect bivalve (e.g., clam) samples in estuarine waters. Establishment of routine monitoring of bivalve tissues is needed in order to establish that they meet federal guidance levels for metals. Targeted contaminants identified under the National Shellfish Sanitation Program include arsenic, cadmium, chromium, lead, mercury and nickel. Meeting federal guidance values could result in opening additional waters to direct market harvest.

Division of Watershed Management

Approximately 117 TMDLs that are required as a result of listings for contaminated fish tissue will be due starting in 2006. The last group is due in 2011. It is very important that current fish tissue data be available for these TMDLs. Conditions have most likely changed since the available data were collected in 1987. In some cases, TMDLs may no longer be necessary, as environmental conditions have improved. This happened in Strawbridge Lake, one of New Jersey's first completed TMDLs. Fish tissue contamination with chlordane was the basis for original listing, whereas current data were available to show that chlordane levels had dropped significantly. To develop a TMDL that reflects current conditions and solve existing contamination problems recurrent sampling and data gathering is crucial.

Site Remediation and Waste Management Program (SRWM)

SRWM's Division of Remediation Management and Response is responsible for the remediation, management and response to environmental impacts associated with hazardous waste sites. For the purpose of evaluating the progress of site characterization and cleanup activities it is important to understand the pathways that contaminants travel through the environmental as well as the risks to both human health and the surrounding ecosystem. Aquatic food chain impacts are common side effects especially from a site contaminated with persistent bioaccumulative toxics (PBTs) such as PCBs, dioxins and mercury. From a risk perspective fish contamination by PBTs can become an important remedial investigative concern in the Remedial Investigation Feasibility Study (RI/FS) process, the first steps in the development of a clean up plan or a claim for natural resource damages. The analysis of fish from this Work Plan will assist SRWM in determining the fate and effects of PBTs from sites into the surrounding environment. Of particular interest to SRWP is the aquatic effects and bioaccumulation of dioxins from the

Diamond-Alkali Facility on the Passaic River, which is the primary source of fish consumption advisories for the surrounding and downstream waters. The Diamond Alkali RI/FS for the Passaic River Area of Concern is ongoing and any additional data from fish contaminant results would be beneficial.

Ecological impacts are also a concern of SRWM. Impacts on the aquatic food chain from contaminants can be significant, and potential risks and impacts can be ascertained from the planned sampling. Levels of contaminants in fish and shellfish (i.e., crabs and lobster), as well as piscivorous birds can be used to approximate the potential ecological risks and impacts to the ecosystem.

III. METHODS

The scope of work is presented below in two tasks. Task I details the baseline status and trends sampling for the Coastal Region of the State. Whereas Task II presents more targeted sampling within the tidal Passaic River and Newark Bay for dioxin/furan analysis to support the Passaic River Directive and the Passaic River/Newark Bay Natural Resource Damage Claim. The latter sampling includes more dioxin analyses of samples, more species per site, and additional down bay sampling of the Lower Passaic-Hackensack Rivers, Newark and Raritan Bays, and Sandy Hook Bay. Sampling will be coordinated with other state or federal agencies' fish/shellfish collection efforts (e.g., NMFS) where appropriate.

Task I. Coastwide Routine Monitoring: Estuarine & Marine Species

Seven species of estuarine-marine fish/shellfish (striped bass, bluefish, white perch, white catfish, American eel, blue crab and lobster) are under consumption advisories on a statewide, regional and waterway specific for PCB and/or dioxin contamination. These species and locations are a starting point for the design of the Fish Monitoring Program (See Table 1). Weakfish and five samples of other fish species of opportunity (snapper bluefish, winter flounder, menhaden or other species) will be collected from select locations. Unless specified, fillets from all coastal estuarine and marine species will be analyzed for PCBs, pesticides and total mercury, as well as lipids (Table 2). Monitoring for dioxins/furans at specific stations (e.g., Newark Bay and Raritan River) will be included in Task II. Sampling includes alongshore-coastal areas, Delaware Bay and Estuary and Barnegat Bay. If supplemental funding becomes available, additional sampling sites, fish species or non-routine contaminants may be included in the monitoring program. A subset of samples will be analyzed for polybrominated diphenyl ethers (PBDEs) under an initial screening assessment to be developed in conjunction with the laboratory.

The results of this monitoring will expand upon the existing contaminant database used to develop fish consumption advisories. The monitoring will identify chemical contaminant levels in Atlantic marine and estuarine species from several waterways throughout the coastal portions of the state.

Table 1. Planned Sampling Locations and Samples for Task I

Sampling Locations	Striped Bass	Bluefish	Amer. Eel	Blue Crab*	White Perch	White Catfish	Weakfish	Other	Totals
Raritan River at Rt. 35					5				5
Raritan Bay at Union Beach		5				#	5	⌁	20
Delaware River				5*					10
Delaware Bay	5					#	10	⌁	20
Navesink River			5						5
Shrewsbury River			5						5
Shark River			5						5
Mullica River			5						5
Atlantic Ocean just N of Sandy Hook	5	5							10
Atlantic Ocean at Island Beach State Park	5	5							10
Atlantic Ocean off Belmar	5	5							10
Atlantic Ocean E of Sea Isle City	5	5							10
Barnegat Bay at Toms River			5	5*			5	⌁	20
Totals	25	25	25	20	5	5	20	10	135
ANALYSES: PCBs (congeners + coplanars), Pesticides & Mercury									

* Each crab sample to be separately analyzed as muscle and hepatopancreas (i.e., total = sample x 2). Each sample will be a composite of approximately 5 individuals.
# Indicates potential collection site for indicated species.
⌁ Indicates potential collection site. A total of five samples of other fish species of opportunity (snapper bluefish, winter flounder, menhaden or other species) will be collected from one of these locations.

Table 2. Analyte List for Task I

OC Pesticides	***Polychlorinated Biphenyls (congeners)***[1]					
BHC (alpha, beta, gamma delta)	1	31,28	74	134,144	185	207
Heptachlor	3	33,21,53	70,76	107	174	194
Heptachlor epoxide	4,10	22	66,95	149	177	205
Chlordanes (gamma and alpha)	6	45	91	118	201,171	206
Nonachlors (cis[2] and trans)	7	46	56,60	134	172,197	209
Dieldrin	8,5	52	101	131	180	16,32
DDDs (o,p and p,p)	14	49	99	146	193	163,138
DDEs (o,p[3] and p,p)	19	48,47	83	132,153,105	191	25
DDTs (o,p and p,p)	12,13	44	97	141	199	63
Aldrin	18	37,42	81,87	137,176	170,190	151
Endosulfan I and II	17	41,71	85	158	198	128
Endrin	24,27	64	136	129,178	201	208,195
Oxychlordane	29	40	77,110	187,182	203,196	
	26	100	82	183	189	
Total Mercury						
	Co-Planar PCBs					
PBDEs	81	77	126	169		
Lipids						

1-PCB congeners appearing as pairs or triplets will coelute and will be reported as sum.
2-Evidence for PCB coelution with cis-nonachlor
3-o,p-DDE coelutes with PCB congeners 92,85

Task II. Tidal Passaic River and Downstream Receiving Waters (NRD)

In recognition of the continuing public health advisories associated with dioxin contamination in foodfish and shellfish within the tidal Passaic River, Newark Bay, the two Kills, Raritan and Sandy Hook Bays, as well as the near shore ocean waters of the New York Bight, a separate yet interrelated study will be carried out involving the collection of fish/shellfish/bird samples for dioxin/furan analysis. These locations will be sampled differentially for four species; white perch, striped bass, blue crab and American lobster within their preferred ecological zones or habitats (Table 3). An additional "species of opportunity" will be collected at two locations. Potential species include winter flounder, snapper bluefish, weakfish, and menhaden. Cormorant tissue (i.e., eggs and/or blood) will be collected at two locations. Species and sample location are designed to address multiple program data needs including water quality assessment, contaminated site assessment, natural resource damage claims, TMDLs and resource management concerns.

Each tissue (i.e., fillet, muscle, hepatopancreas, egg, and blood) will undergo analysis for dioxins/furans, PCBs/Pesticides, mercury and lipids (Table 4). Composite samples will be used for crab and lobster tissue. A subset of samples will also be analyzed for PBDEs under an initial screening assessment to be developed in conjunction with the laboratory.

Optional Sampling: DEP programs also identified several additional data needs. If money is available, additional species will be collected at the same or additional locations. Samples will potentially include bivalve clams (e.g., in Raritan/Sandy Hook Bay) and other fish species.

Table 3. Planned Sampling Locations and Samples for Task II

Sampling Locations	Crab*	Lobster*	White Perch	Striped Bass	Fish Species	Piscv. Bird**	Totals
Upper Tidal Passaic	5						10
Lower Tidal Passaic	5		3	3	✒		16
Hackensack River	3				✒		6
Newark Bay	3				✒	6	15
Upper Bay	3						6
Arthur Kill	3						6
Raritan River	3						6
Western Raritan Bay	3				✒		9
Eastern Raritan Bay	3				✒		6
Mid-Lower Raritan Bay	3	5		2	✒	6	24
Offshore NY Bight		5					10
Totals	68	20	3	5	6	12	114

* Each crab and lobster sample to be separately analyzed as muscle and hepatopancreas (i.e., total = sample x 2). Each sample will be a composite of approximately 5 individuals.
** Piscivorous bird samples will consist of cormorant eggs and/or blood.
✒ Three samples of other fish species of opportunity will be collected in the Newark Bay/Passaic/Hackensack region, and three samples will be collected in Raritan Bay. Target species will include weakfish, winter flounder, snapper bluefish, and menhaden.

Tissue Processing

Fish tissue samples will be processed according to the planned analysis. The program will follow the procedure used in past monitoring programs (i.e., ANSP Procedure P-14-12 (Rev. 4 (12/00) titled Preparation of Fish Samples For Contaminant Analysis):

3.1.1 Fillet with skin, but with scales removed this is the default type of tissue sample for most scaly fish (i.e. sunfish and shad). This consists of the entire fillet or pairs of fillets (right and left sides), overlaying skin and belly flap meat.

3.1.3 Fillet without skin - (i.e. gar, catfish, sturgeon), This consists of the entire fillet, including the belly flap tissue, with skin and scales removed.

3.1.4 Fillet with skin on (except catfish and eels), scales off and including pelvic fin, rib cage and belly meat (equivalent to USFDA fillet and "New York standard fillet").

Fish prepared using 3.1.1 and 3.1.4 will be analyzed for organic compounds (i.e. PCBs, OCP, and dioxin) and fish prepared using 3.1.3 will be used for mercury analysis.

Table 4. Analyte List for Task II

OC Pesticides	***Individual PCB congeners***			
Alpha HCH	1	41/64	118	180
Beta HCH	7/9	40	114	193
Gamma HCH	8/5	67	146	191
Delta HCH	30	63	153/132	200
Heptachlor	18/17	74/61	105	169
Heptachlor Epoxide	15	70	141/179	170/190
Oxychlordane	24/27	66	130	199
Alpha Chlordane	16/32	95/80	176/137	203/196
Gamma Chlordane	29	55/91	138 /160	189
Cis-Nonachlor	26	56/60	58	195/208
Trans-Nonachlor	25	92	129	207
Aldrin	31	84	126	194
Dieldrin	28	101/90	178	205
Endrin	33/20	99	166	206
Pentachloroanisole	53	119	175	209
Chlorpyrifos	22/51	83	187	
Mirex	45	97	183	***Coplanar PCBs***
Endosulfan II	46	81	128	81
Methoxychlor	39	87/115	167	77
2,4' DDE	69	85	185	126
4,4' DDE	52	136	174	169
2,4' DDD	49	110/77	177	
4,4' DDD	47/75	82	171/202	
2,4' DDT	48	151	156	
4,4' DDT	44	135	201/157/173	
Trace Metals	42/59/37	107	172	
Mercury	72	149/123	197	Lipids

Dioxins and Furans		
2,3,7,8-TCDD	2,3,7,8-TCDF	1,2,3,7,8,9-HxCDF
1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8-HxCDD	2,3,4,7,8-PeCDF	1,2,3,4,7,8,9, -HpCDF
1,2,3,6,7,8-HxCDD	1,2,3,4,7,8-HxCDF	OCDF
1,2,3,7,8,9-HxCDD	1,2,3,6,7,8-HxCDF	OCDD
1,2,3,4,6,7,8-HpCDD	2,3,4,6,7,8-HxCDF	
PBDEs		

Analytical Methods

The Academy of Natural Sciences of Philadelphia (ANSP) and the Geochemical and Environmental Research Group (GERG) at Texas A&M University will be conducting the analysis of all tissue samples. These laboratories will use the following analytical methods as outlined in Table 5 and detection limits are listed in Tables 6 and 7.

Table 5. Analytical Methods for Tasks I and II

DESCRIPTION OF PROCEDURES USED:	GERG	ANS
EPA Method	**Modified 8082 PCBs by GC-ECD**	**Modified 8082 PCBs by GC-ECD**
Approximate amount of fish tissue extracted (wet wt):	~10 g	~1 to 5 g
Method used for determining percentage water:	drying and weighing	drying and weighing
Method used for extractables (lipid):	gravimetric	gravimetric
Extraction method:	grinding with sodium sulfate	grinding with sodium sulfate
Extraction solvent:	dichloromethane	dichloromethane
Extraction time:	3 x 3 min	18 h Soxhlet
Sample extract cleanup method:	Slica gel/alumina and phenogel	GPC followed by florosil
Analytical method used for PCBs and Organochlorine Pesticides (OCPs):		
Analytical Instrument.	GC-ECD	GC-ECD
Column Phase	DB 5	DB 5
Column Length, m	30m	60 m
Column i.d., mm	0.25 mm	0.25 mm
Column film thickness, µm	0.25um	0.25um
Method of quantitation (IS = internal standard, ES = external standard):	IS	IS
Identity of internal standards/surrogates used that were:		
Added PRIOR to extraction of sample:	DBOFB, PCB 103, PCB198	PCB14, PCB65,PCB166
Added after extraction/cleanup and JUST PRIOR to chromatographic analysis:	TCMX	PCB30,PCB204
Number of Points on Calibration Curve		
PCB Congeners	4	5
Pesticides	4	5
Range of Calibration Curve		
PCB Congeners	5 to 200 ng/ul	30 to 300 ng/ul
Pesticides	5 to 200 ng/ul	0.25 to 2.5 ng/ul
Coplanar PCBs using HRGC/HRMS	EPA Method 1668	-
Mercury using Cold Vapor AA		
Sample Preparation: Microwave Assisted Digestion of Siliceous and Organically Based Matrices. 1996.	-	EPA, SW-846, modified Method 3052
Sample Analysis: Mercury in Liquid Waste (Manual Cold-Vapor Technique). 1994. Rev. 1.	-	EPA, SW-846, modified Method 7470A
Dioxin using HRGC/HRMS	Modified EPA Method 1613	-

Table 6. GERG Analytical Detection Limits

Pesticides	Detection Limit (ng/g wet)	PCB Congeners	Detection Limit (ng/g wet)	PCB Congeners	Detection Limit (ng/g wet)
Alpha HCH	0.01	PCB1	0.02	PCB118	0.02
Beta HCH	0.02	PCB7/9	0.02	PCB119	0.02
Gamma HCH	0.01	PCB8/5	0.02	PCB126	0.02
Delta HCH	0.01	PCB22/51	0.02	PCB128	0.01
Heptachlor	0.01	PCB24/27	0.02	PCB129	0.02
Heptachlor Epoxide	0.02	PCB25	0.02	PCB130	0.02
Oxychlordane	0.03	PCB26	0.02	PCB135	0.02
Alpha Chlordane	0.02	PCB28	0.02	PCB136	0.02
Gamma Chlordane	0.02	PCB29	0.02	PCB138 /160	0.03
Cis-Nonachlor	0.02	PCB30	0.02	PCB141/179	0.02
Trans-Nonachlor	0.04	PCB31	0.02	PCB146	0.02
Aldrin	0.02	PCB33/20	0.02	PCB149/123	0.02
Dieldrin	0.05	PCB39	0.02	PCB15	0.02
Endrin	0.04	PCB40	0.02	PCB151	0.02
Pentachloroanisole	0.01	PCB41/64	0.02	PCB153/132	0.05
Chlorpyrifos	0.06	PCB42/59/37	0.02	PCB156	0.02
Mirex	0.01	PCB44	0.02	PCB158	0.02
Endosulfan II	0.02	PCB45	0.02	PCB16/32	0.02
2,4' DDE	0.02	PCB46	0.02	PCB166	0.02
4,4' DDE	0.06	PCB47/75	0.02	PCB167	0.02
2,4' DDD	0.07	PCB48	0.02	PCB169	0.02
4,4' DDD	0.01	PCB49	0.02	PCB170/190	0.02
2,4' DDT	0.00	PCB52	0.02	PCB171/202	0.02
4,4' DDT	0.01	PCB53	0.02	PCB172	0.01
		PCB55/91	0.02	PCB174	0.02
Dioxins & Furans	pg/sample[1]	PCB56/60	0.02	PCB175	0.02
2,3,7,8-TCDF	10.00	PCB63	0.02	PCB176/137	0.02
1,2,3,7,8-PeCDF	50.00	PCB66	0.02	PCB177	0.02
2,3,4,7,8-PeCDF	50.00	PCB67	0.02	PCB178	0.02
1,2,3,4,7,8-HxCDF	50.00	PCB69	0.02	PCB18/17	0.02
1,2,3,6,7,8-HxCDF	50.00	PCB70	0.02	PCB180	0.01
2,3,4,6,7,8-HxCDF	50.00	PCB72	0.02	PCB183	0.02
1,2,3,7,8,9-HxCDF	50.00	PCB74/61	0.02	PCB185	0.02
1,2,3,4,6,7,8-HpCDF	50.00	PCB81	0.02	PCB187	0.02
1,2,3,4,7,8,9-HpCDF	50.00	PCB82	0.02	PCB189	0.02
OCDF	100.00	PCB83	0.02	PCB191	0.02
2,3,7,8-TCDD	10.00	PCB84	0.02	PCB193	0.02
1,2,3,7,8-PeCDD	50.00	PCB85	0.02	PCB194	0.02
1,2,3,4,7,8-HxCDD	50.00	PCB87/115	0.03	PCB195/208	0.01
1,2,3,6,7,8-HxCDD	50.00	PCB92	0.02	PCB197	0.02
1,2,3,7,8,9-HxCDD	50.00	PCB95/80	0.02	PCB199	0.02
1,2,3,4,6,7,8-HpCDD	50.00	PCB97	0.02	PCB200	0.02
OCDD	100.00	PCB99	0.02	PCB201/157/173	0.02
Coplanar PCBs	pg/sample[1]	PCB101/90	0.02	PCB203/196	0.02
PCB77	10.20	PCB105	0.01	PCB205	0.02
PCB81	10.00	PCB107	0.02	PCB206	0.01
PCB126	10.00	PCB110/77	0.02	PCB207	0.02
PCB169	10.40	PCB114	0.02	PCB209	0.01

1 - Dependent on size of sample extracted

Table 7. ANSP Analytical Detection Limits

	Detection Limit		Detection Limit		Detection Limit
Pesticides	ng/g wet	**PCB Congeners**	ng/g wet	**PCB Congeners**	ng/g wet
opDDE	0.04	1	0.17	85	0.02
ppDDE	0.18	3	0.29	136	0.01
op ddt	0.12	4+10	0.07	77+110	0.11
pp ddt	0.51	7	0.03	82	0.02
o,p ddd	0.06	6	0.02	151	0.02
p,p ddd	0.14	8+5	0.12	135+144	0.02
	0.00	19	0.03	107	0.01
alpha BHC	0.17	12+13	0.01	149	0.06
beta BHC	0.16	18	0.05	118	0.06
delta BHC	0.07	17	0.03	131	0.00
lindane	0.12	24+27	0.13	146	0.06
	0.00	16+32	0.07	153+132+105	0.21
heptaclor	0.06	29	0.08	141	0.01
heptachlor epoxide	0.11	26	0.02	137+176	0.04
oxychlordane	0.09	25	0.23	163+138	0.14
gamma chlordane	0.30	31+28	0.13	158	0.06
alpha chlordane	0.12	53+33+21	0.07	129+178	0.02
cis nonachlor	0.10	22	0.11	187+182	0.05
trans nonachlor	0.16	45	0.02	183	0.03
	0.00	46	0.02	128	0.02
dieldrin	0.02	52	0.09	185	0.02
endrin	0.08	49	0.07	174	0.02
aldrin	0.15	47	1.08	177	0.02
endosulfan 1	0.10	48	0.22	202+171	0.02
endosulfan II	0.06	44	0.07	157+200	0.03
		37+42	0.06	172+197	0.08
		41+71	0.08	180	0.07
PBDEs	To be determined	40	0.02	193	0.15
		100	0.02	191	0.01
		63	0.02	199	0.01
		74	0.06	170+190	0.05
		70+76	0.08	201	0.03
		66+95	0.19	203+196	0.05
		91	0.02	189	0.01
		56+60	0.12	208+195	0.05
		101	0.07	207	0.01
		99	0.04	194	0.02
		83	0.01	205	0.01
		97	0.02	206	0.03
		87+81	0.24	209	0.01

IV. SCHEDULE

This estuarine/marine component reflects Year 2 of the five-year plan meant to assess on a routine rotating basis, all the critical waterways in New Jersey where fish consumption advisories are in place due to the bioaccumulation of toxic chemicals (i.e., PCBs, dioxins, and mercury). See Figure 1 for the full fish advisory and sampling schedule for marine/estuarine waters.

Field Sampling (Summer –Fall 2004)

Task I routine fish sampling will begin in mid-late summer of 2004. Task II sampling will take place in late summer to early fall of 2004 (i.e., August through October). This will allow capture of fish and shellfish that have migrated into the estuary and spent the summer there creating the largest potential for bioaccumulation. These samples will reflect the largest potential for ecological effects, as well as potential health effects on fish consumers.

Laboratory Preparation and Analysis (2004 – 2005)

The laboratory will initiate sample preparation in August 2004. It is estimated that data will be available six months following the laboratories receipt of samples. Draft data will be available in May 2005.

Assessment and Reporting (Summer - Fall 2005)

The laboratory will prepare a draft report containing analytical and quality assurance/quality control procedures along with all of the sample data. This will be available by July 2005, and a Final Report will be available by November 2005. Data generated through this monitoring program will be utilized to identify the status and trends of selected contaminant levels in fish currently under fish consumption advisories. Other assessment activities will be coordinated with appropriate programs (e.g., NRD and water quality analysis for 305(b) and 303(d)) with recommendations for additional data collection as indicated.

All data generated will be placed in the NJDEP's STORET database, which will then be posted to USEPA's national STORET database. This will ensure that the information is readily accessible to other state and Federal agencies as well as the general public. All revisions to the state fish consumption advisories will also be posted on DSRT's web site along with ArcView-based GIS maps with links to other relevant federal and state programs associated with contaminated food fish.

Draft fish advisories will be available for stakeholder review by September 2005. Final revised advisories will be issued in November 2005.

V. BUDGET

Task I Budget: Coastwide Routine Monitoring: Estuarine & Marine Species

The budget for Task I is listed in Table 8 and includes the number of sites and species to be sampled, the number of samples, and estimated costs. The estimated total cost is $216,075.

Table 8. Estimated Sample Collection and Analytical Costs – Task I

No. Sites	No. Species	Species	No. Fish /site /species	Subtotal Samples	Analysis	Cost per sample ($)	Subtotal Cost ($)
5	1	American Eel	5	25	PCBs+ Coplaners, OCP's & Mercury Sample includes QA/QC	$1245	$31,125
2	1	Blue crab – 2 tissues*	5	20			$24,900
1	1	White Perch	5	5			$6,225
1	1	White Catfish	5	5			$6,225
5	1	Striped Bass-Coastal	5	25			$31,125
5	1	Bluefish	5	25			$31,125
3	1	Weakfish	5-10	20			$24,900
2	1	Other Species	5	10			$12,450
Approximately 20 samples from above fish species will be analyzed for PBDEs					PBDEs	$200	$4,000
			Total Number of Samples	135		Subtotal	$172,075
						Collection & Processing	$44,375
						TOTAL	**$216,075**

*1 muscle tissue + 1 hepatopancreas per sample

Task II Budget: Tidal Passaic River and Downstream Receiving Waters (NRD)

This component of the budget is estimated (i.e., final costs will be determined by contractor bid and the actual number of samples collected). The analytical contract for dioxin/furan, PCB congeners, mercury and PBDEs will be approximately $234,500 for the planned 114 samples. Another $49,000 is needed for field collection, reporting, equipment purchase, boat costs, and other miscellaneous costs. Therefore an estimated total cost for Task II would be approximately $284,000 (Table 9).

Table 9. Estimated Sample and Analytical Costs for Task II

No. Sites	Species	No. Samples Per Site	Subtotal Samples	Analysis	Estimated Cost per Sample ($)	Subtotal Cost ($)
10	Blue Crab	3-5*	68	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$138,720
2	Lobster	5*	20	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$40,800
3	Striped Bass	2-3	5	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$10,200
3	White Perch	3	3	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$6,120
2	Fish Species	3	6	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$12,240
2	Piscivorous Bird	6	12	Dioxin/furans; Pesticides/PCBs; Hg	$2,040	$24,480
Approximately 10 samples from above fish species will be analyzed for PBDEs				PBDEs	$200	$2,000
		Total # Samples	114		**Subtotal**	$234,560
					Collection & Processing	$32,865
					Reports	$16,500
					TOTAL	**$283,925**

* Composite samples

TOTAL ESTIMATED PROJECT BUDGET: $500,000

Figure 1. Routine Fish Monitoring Program & Advisory Schedule

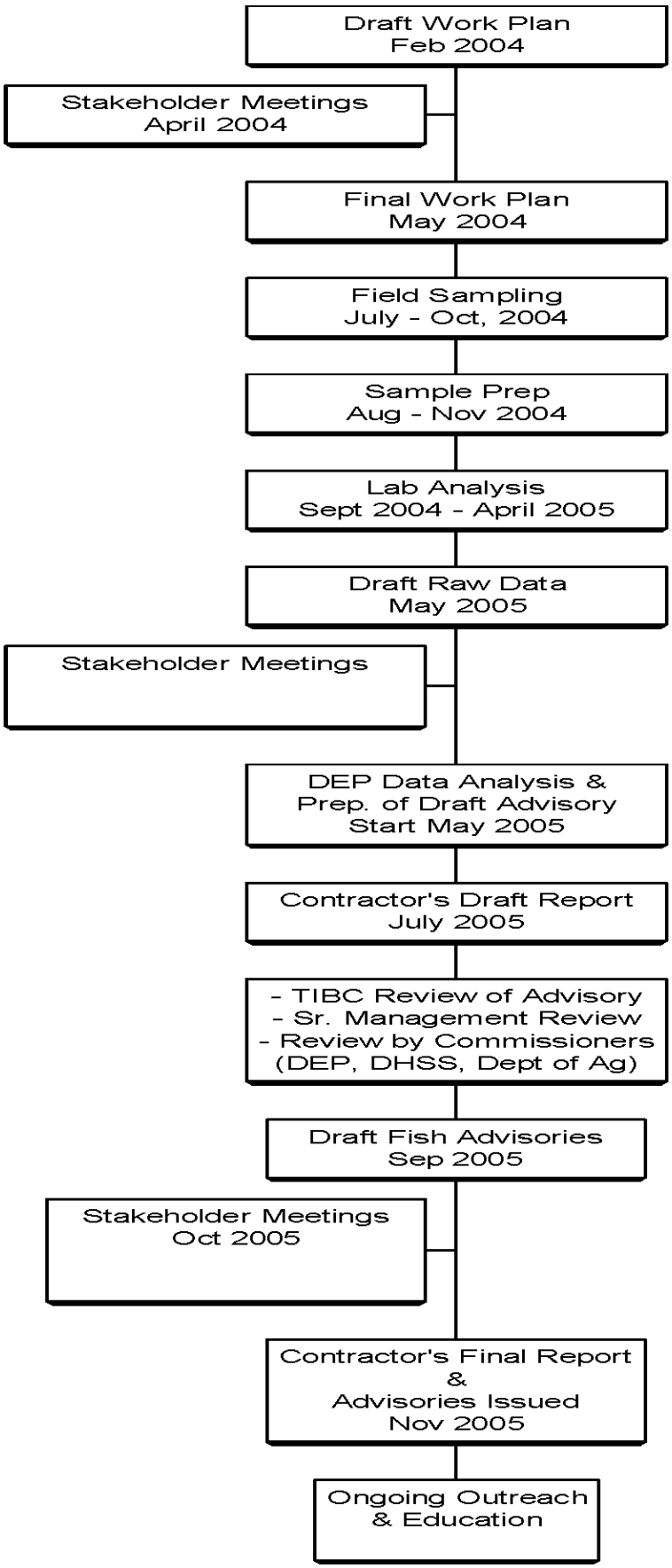

Figure 2. All Sampling Locations

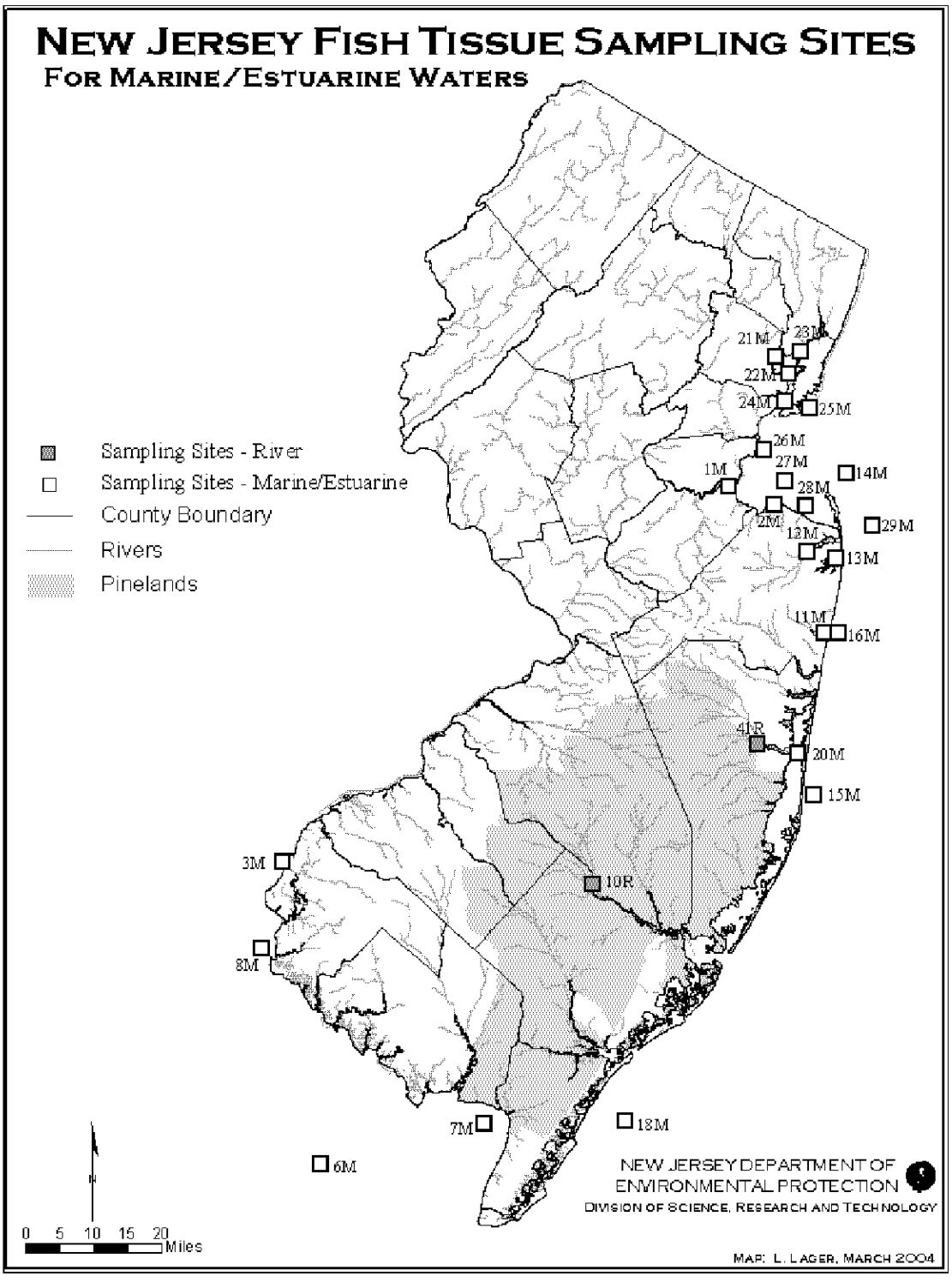

Figure 3. Sampling Locations in the Northeast Region

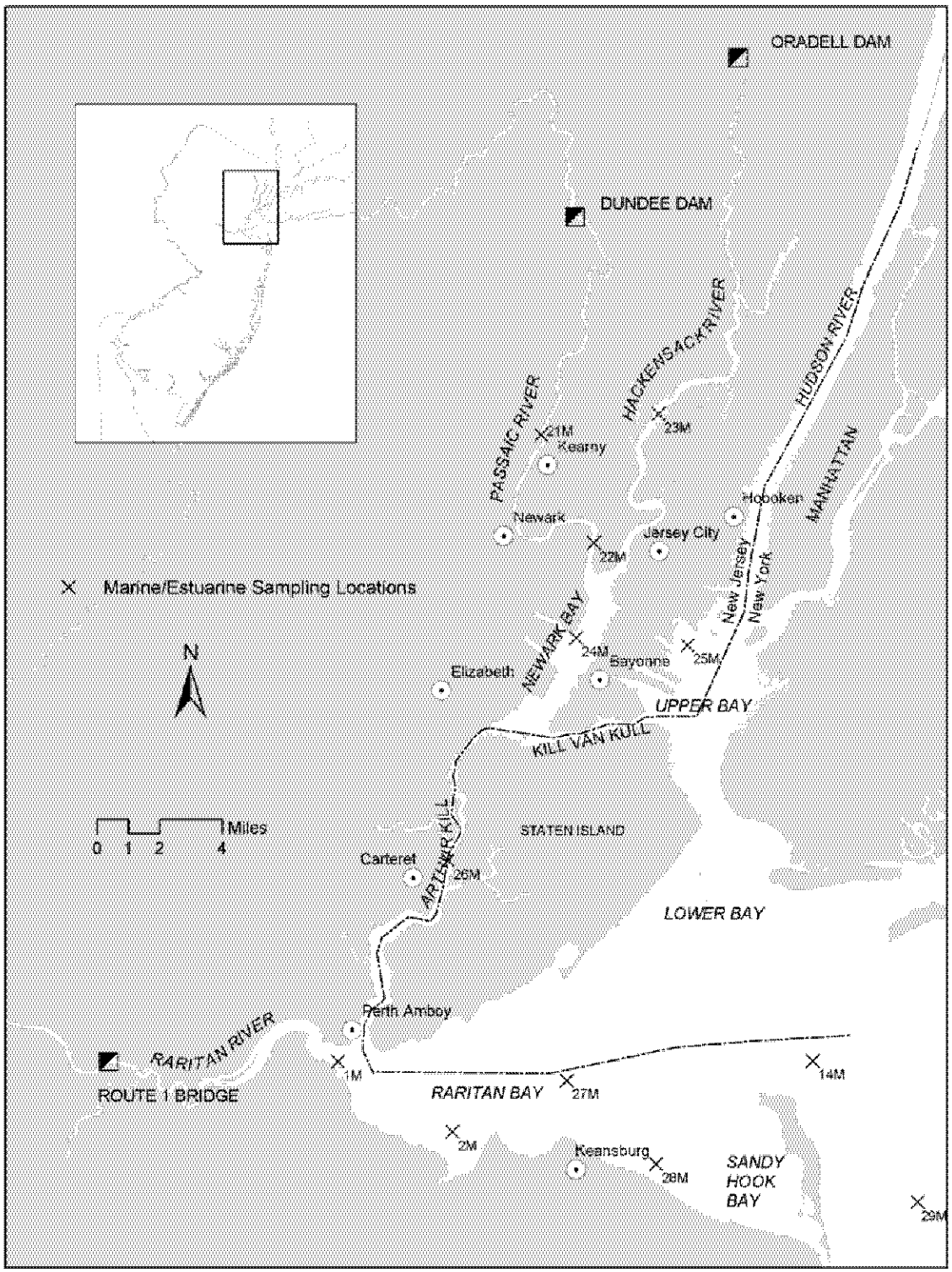

Table 10. Marine and Estuarine Sampling Stations for 2004

Sample Designation	Location
Coastal and Estuarine Stations – Task I	
1M	Raritan River at Rt. 35
2M	Raritan Bay at Union Beach
3M	Delaware River
6M	Delaware Bay
7M	Delaware Bay W of Reeds Beach
8M	Delaware Bay at Reedy Island
11M	Shark River
12M	Navesink River at Fairhaven
13M	Shrewsbury River
14M	Atlantic Ocean just N of Sandy Hook
15M	Atlantic Ocean at Island Beach State Park
16M	Atlantic Ocean off Belmar
18M	Atlantic Ocean E of Sea Isle City
20M	Barnegat Bay at Toms River
10R	Mullica River
41R	Toms River
Northeast Region Sampling Stations – Task II	
2M	Raritan Bay at Union Beach
21M	Passaic River by Kearny
22M	Lower Passaic River
23M	Hackensack River
24M	Newark Bay
25M	Upper Bay
26M	Arthur Kill
27M	Mid-Raritan Bay
28M	E. Raritan Bay
29M	New York Bight