

# ENVIRONMENTAL EFFECTS OF FISH PLANT EFFLUENTS

PRESENTATION TO  
FISH PLANT EFFLUENTS: WORKSHOP ON SUSTAINABILITY  
SHIPPAGAN, NEW BRUNSWICK, CANADA  
25 FEB-26 FEB 2003



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*et*

**BERTIN GAUVIN**

*(Coalition pour la viabilite de l'environnement de Shippagan et des  
Iles Lameque et Miscou)*

**with support from**

**NEW BRUNSWICK ENVIRONMENTAL TRUST FUND**

# BACKGROUND TO LAMEQUE ISSUE



# SCOPE OF ISSUE (1)

- **MARINE BIO-RESOURCES (FISH) PROCESSING FACILITIES ARE LOCATED IN MANY HARBOURS THROUGHOUT ATLANTIC CANADA.**
- **FORM MAJOR INDUSTRY & ECONOMIC BASE FOR NUMEROUS RURAL COMMUNITIES.**



# SCOPE OF ISSUE (2)

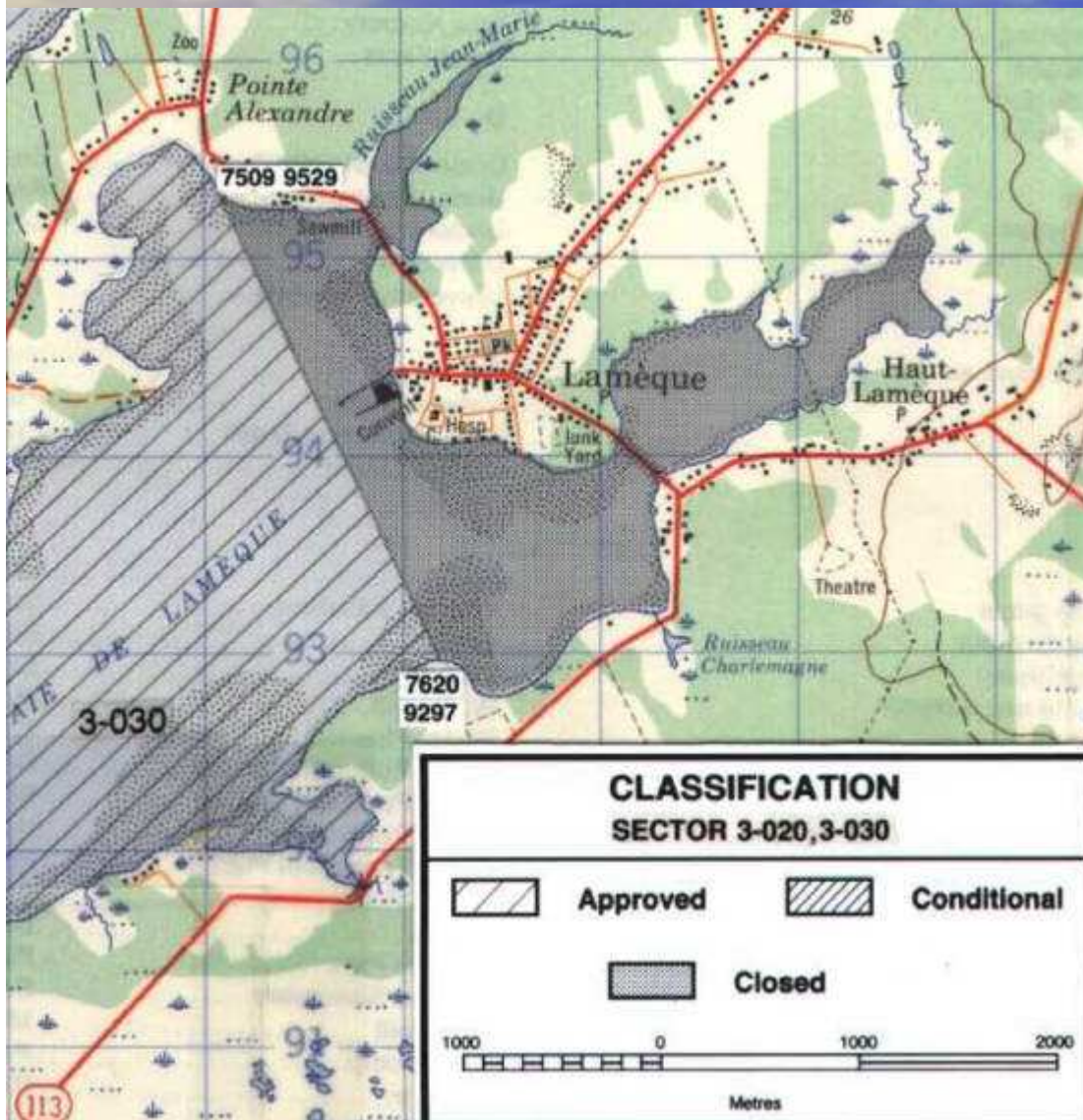
- **MOST EFFLUENT CONTROLS BASED ON 1977 ENVIRONMENT CANADA GUIDELINES.**
- **WASTES & EFFLUENTS TYPICALLY VIEWED AS “NATURAL” – NO CHEMICALS ADDED.**



# SCOPE OF ISSUE (3)

ITEM	UNITS	LAMEQUE CRAB	LAMEQUE SHRIMP	LAMEQUE FISH	GEM ST. SIMON LOBSTER
FAECAL COLIFORM	NPP/100 mL	11,000	17,000	2	14,000
BOD	mg/L	730	1,400	13	190
COD	mg/L	1,250	1,770	90	234
TOTAL PHOSPHORUS	mg/L	8.8	14	0.21	2.5
TOTAL KJELDAHL	mg/L	120	98	24	26
TOTAL SUSPENDED SOLIDS	mg/L	478	1,240	15	74

# SCOPE OF ISSUE (4)



**SCOPE AND NATURE OF PROCESSING EFFLUENTS IMPACTS OTHER COASTAL ZONE USERS:**

**300 m CLOSURE FROM OUTFALL FOR SHELLFISH & AQUACULTURE**

# ISSUE IN LAMEQUE

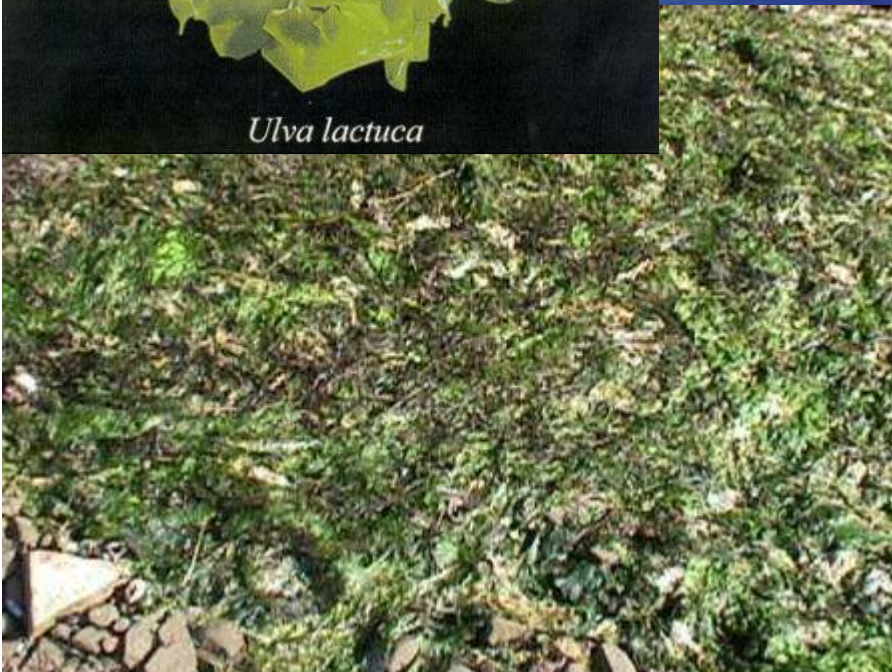
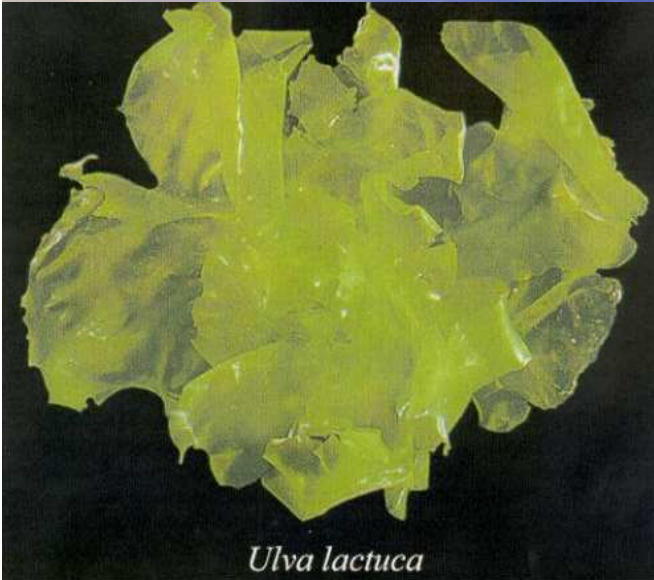
**CITIZENS' COMPLAINT:  
"ROTTEN EGGS" ODOUR  
FROM ACCUMULATION OF  
ROTTING SEA WEED ALONG  
TOWN WATERFRONT.**



## **Mauvaise qualité de l'air à Lamèque (02/07/26)**

- **FREDERICTON (CNB) - - Le médecin hygiéniste a annoncé aujourd'hui que les résidents de la région de Lamèque qui sont sensibles aux fortes odeurs devraient limiter le temps passé à l'extérieur au cours des prochains jours.**
- **Selon le D<sup>r</sup> David Assaff, des odeurs fortes ont été signalées dans la région de Lamèque notamment pendant les marées basses, lorsque les algues sont à découvert sur les plages avoisinantes. Bien que cette odeur n'affecte pas la santé de la population, le D<sup>r</sup> Assaff affirme qu'elle peut causer des nausées, des maux de tête et une irritation des yeux et de la gorge chez certaines personnes.**
- **« Le ministère de l'Environnement et des Gouvernements locaux a surveillé les niveaux de soufre réduit total dans la région de Lamèque et des niveaux plus élevés que la normale ont été signalés à plusieurs reprises tout récemment, a expliqué le D<sup>r</sup> Assaff. Bien que les niveaux soient toujours bien en dessous du niveau pouvant entraîner des effets nocifs aigus pour la santé des humains, certaines personnes qui sont sensibles aux odeurs fortes devraient prendre des précautions lorsque l'odeur est présente et réduire le temps passé à l'extérieur. »**
- **Le ministère de l'Environnement et des Gouvernements locaux continuera de travailler de concert avec la collectivité et d'autres organismes en vue de déterminer et d'éliminer la source du problème de cette odeur.**

# WHAT IS THE SOURCE OF THE ODOURS? EXCESS GROWTH AND ACCUMULATION OF SEA LETTUCE



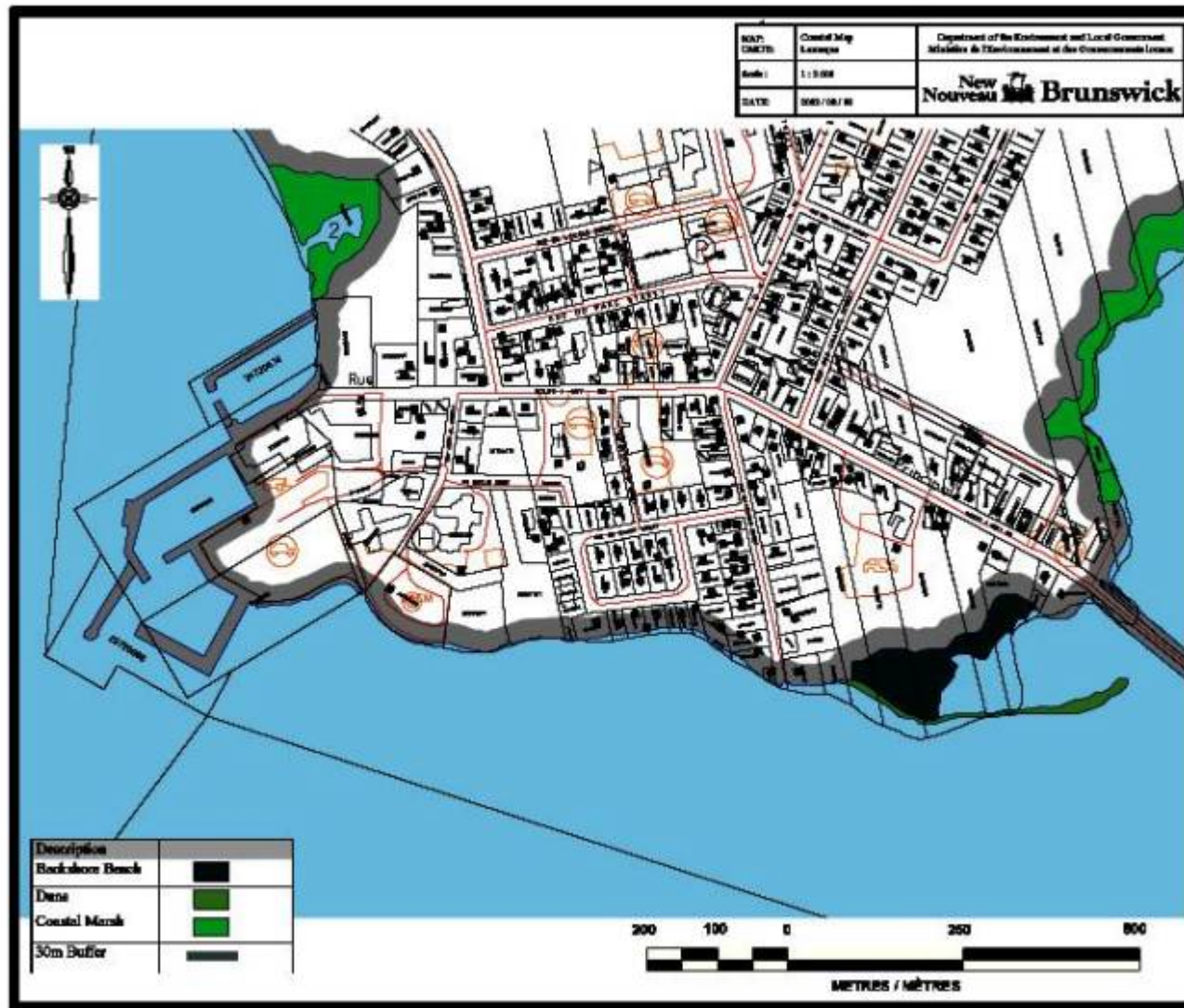
**BAIE DE LAMEQUE FROM  
TOWN JULY 2002**

# **WHY SEA LETTUCE?**

**“OPTIMUM GROWTH” ZONE IN FRONT OF TOWN FROM PORTUAIRE DE LAMEQUE TO HAUT LAMEQUE CAUSEWAY.**

- **LIMITED PHYSICAL DISPLACEMENT (CURRENTS AND WAVES).**
- **SHALLOW WATER WITH GOOD SUNLIGHT.**
- **SUFFICIENT NUTRIENTS FOR GROWTH (NITROGEN & PHOSPHORUS).**
- **ABLE TO GROW RAPIDLY IN LOW-MEDIUM POLLUTED ENVIRONMENTS.**
- **FRONDS BREAK OFF EASILY, TRANSPORTED ASHORE, ACCUMULATE AND DECOMPOSE.**

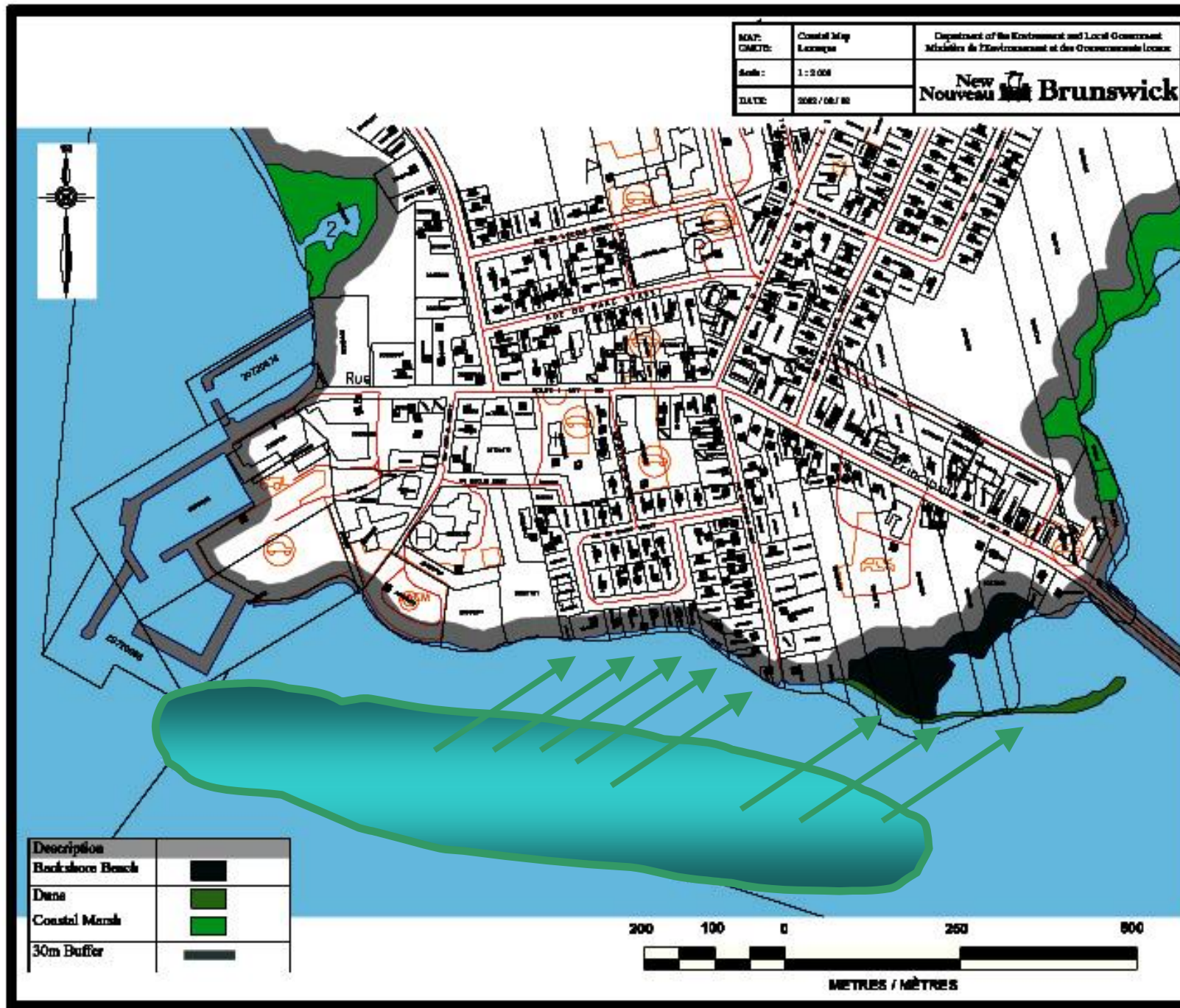
# STUDY FINDINGS AND CONCLUSIONS




# **RESULTS (1)**


## **SEA LETTUCE GROWTH**

- **EXCESS AMOUNTS OF NUTRIENTS PROMOTE GROWTH OF SEA LETTUCE.**
- **ACCUMULATION OF SEA LETTUCE OCCURS MOSTLY ALONG TOWN WATERFRONT.**
- **DECOMPOSITION OF SEA LETTUCE AND OTHER ALGAE CREATES SERIOUS ODOUR PROBLEM – NUISANCE AND HEALTH ISSUE.**
- **INNER BAY SEDIMENTS HAVE ALSO BECOME RESERVOIR OF NUTRIENTS.**
- **GROWTH AND SPREAD OF SEA LETTUCE THREATENS ECOSYSTEM OF BAIE – ANOXIC SEDIMENTS IN GROWTH AREAS AND RELEASE OF SULPHIDES.**





## **RESULTS (2) COOP OUTFALL**

- **L'ASSOCIATION COOPERATIVE des PECHEURS de L'ILLE LAMEQUE LTEE. FACILITY DISCHARGES SIGNIFICANT AMOUNTS OF OXYGEN-DEMAND MATERIALS AND NUTRIENTS (N & P).**
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# RESULTS (3)

## NUTRIENT DISTRIBUTIONS

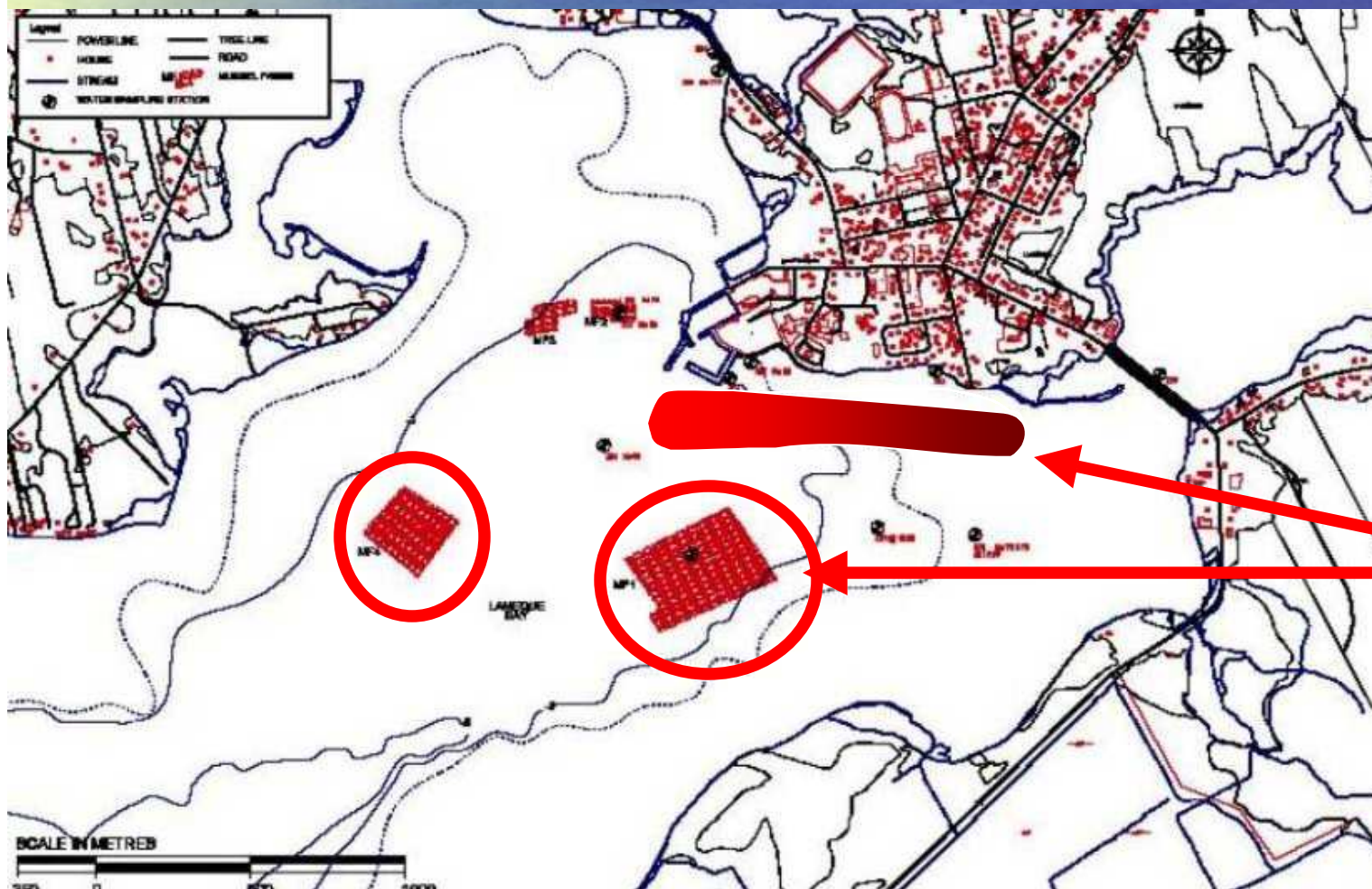
<b>SAMPLE LOCATION (13-08-02)</b>	<b>AMMONIA (mg/L)</b>	<b>KJELDAHL NITROGEN (mg/L)</b>	<b>TOTAL PHOSPHORUS (mg/L)</b>
<b>MUSSEL LEASE #1</b>	<b>&lt;0.05</b>	<b>1.1</b>	<b>0.074</b>
<b>MUSSEL LEASE #2</b>	<b>&lt;0.05</b>	<b>1.7</b>	<b>0.057</b>
<b>CHANNEL 1</b>	<b>&lt;0.05</b>	<b>1.1</b>	<b>0.080</b>
<b>BEACH</b>	<b>0.17</b>	<b>2.2</b>	<b>0.092</b>
<b>LAMEQUE COOP PLANT EFFLUENT</b>	<b>98</b>	<b>300</b>	<b>15.3</b>

# **UN-MEASURED CONTRIBUTIONS FROM NON-POINT SOURCES**

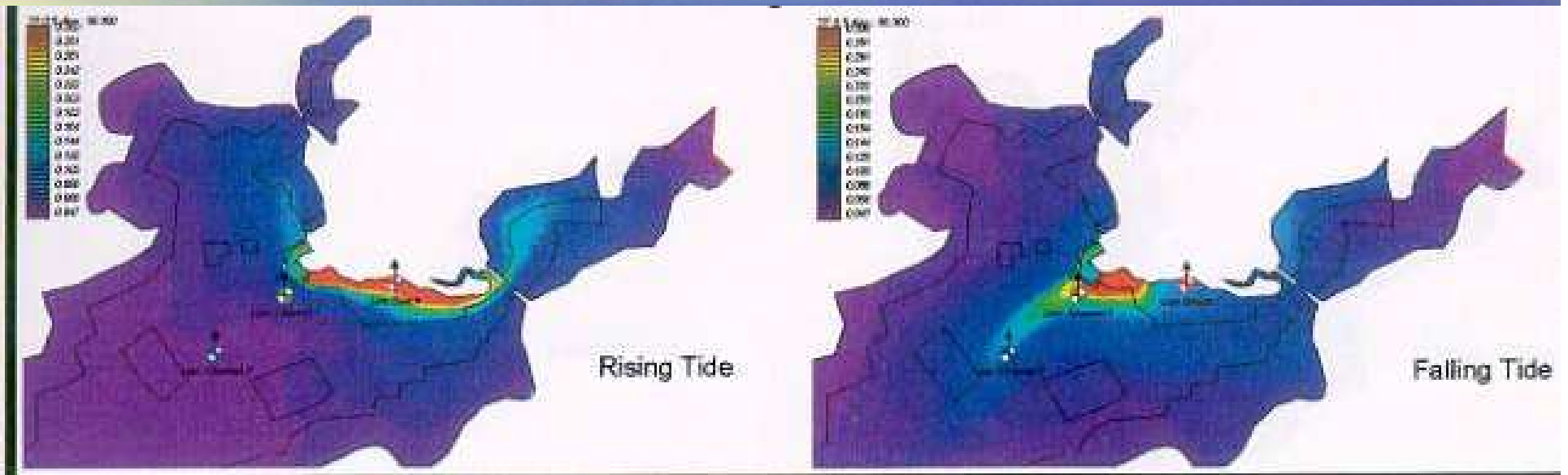


**LIQUID NON-  
POINT  
SOURCE  
WASTES  
DURING  
HERRING  
OFF-LOADING**

# UN-MEASURED CONTRIBUTIONS FROM SEDIMENT AND AQUACULTURE SOURCES



# RESULTS (4) NUTRIENT LOADING FROM EFFLUENT




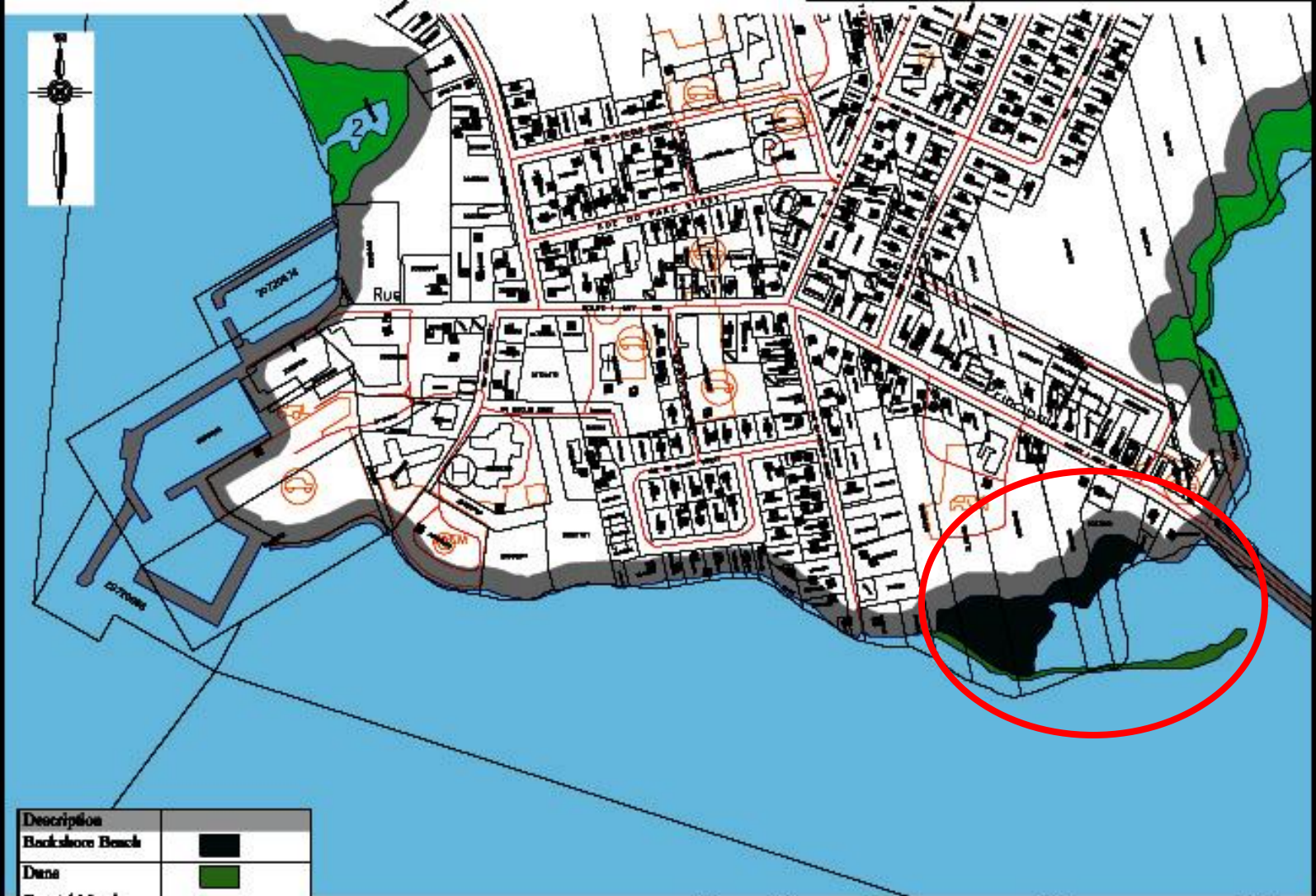
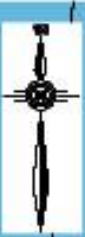
**EFFLUENT PLUMES FROM EXISTING  
LAMEQUE COOP OUTFALL AS  
CONCENTRATIONS OF TOTAL  
PHOSPHORUS (mg/L)**







## **RESULTS (5): SALTMARSH**

- **ODOUR ISSUE ASSOCIATED WITH SALTMARSH AT HAUT LAMEQUE CAUSEWAY**
- **FUNCTION OF POOR DRAINAGE (IMPACT OF CAUSEWAY CONSTRUCTION) AND ACCUMULATED SEA LETTUCE AND GROWTH OF OTHER ALGAE**

MAP:	Coastal Map	Department of the Environment and Local Government
DMTD:	Lezage	Ministère de l'Environnement et des Gouvernements locaux
Scale:	1:2000	 <b>New Brunswick</b>
DATE:	2002/08/30	

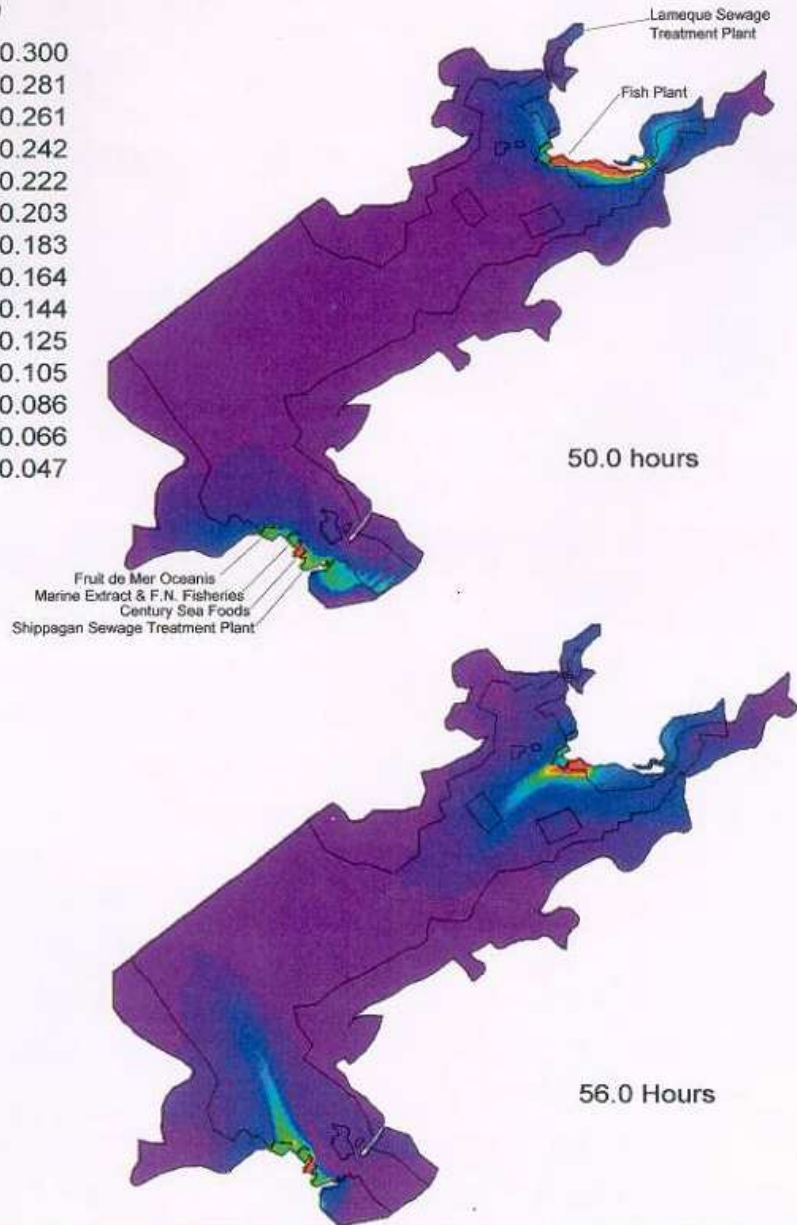
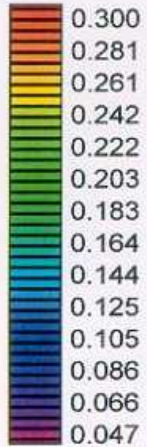


Description	
Backshore Beach	
Duna	
Coastal Marsh	
30m Buffer	



# RESULTS (6) INFLUENCE OF SHIPPAGAN EFFLUENTS

Phosphorus Concentrations  
(mg/L)



**DISCHARGES OF FISH  
PROCESSING  
FACILITIES IN  
SHIPPEGAN ARE  
SUFFICIENTLY  
DISPERSED; VERY  
LIMITED EFFECTS ON  
BAIE DE LAMEQUE.**

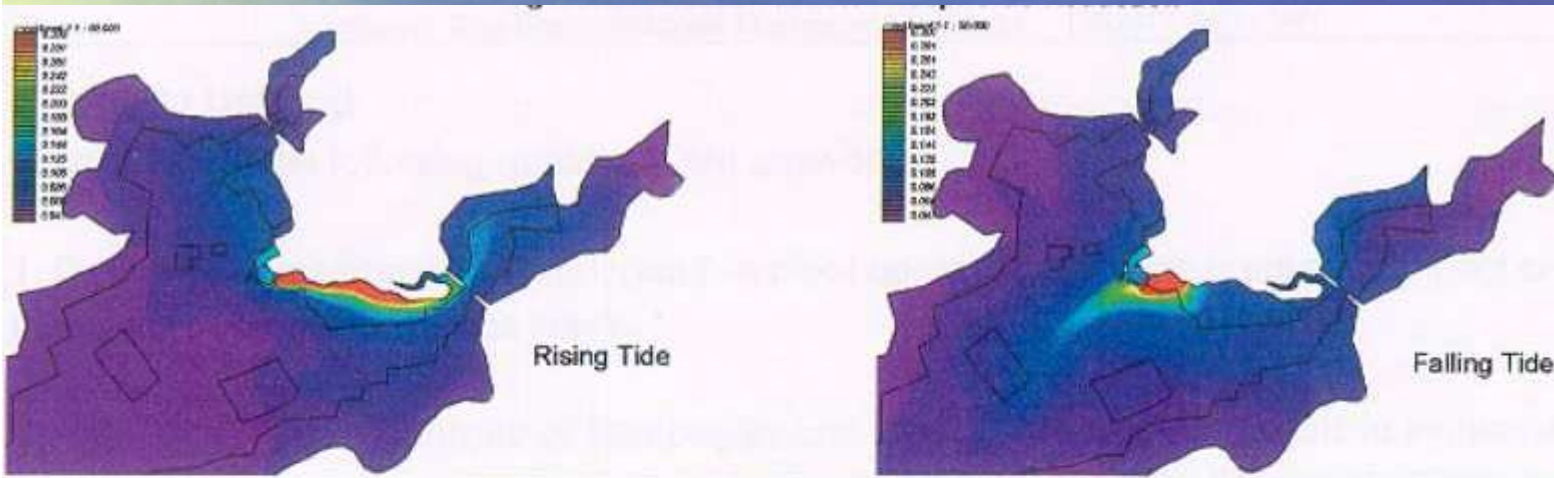
# CONCLUSIONS & RECOMMENDATIONS



# **WHAT TO DO WITH LAMEQUE COOP EFFLUENT?**

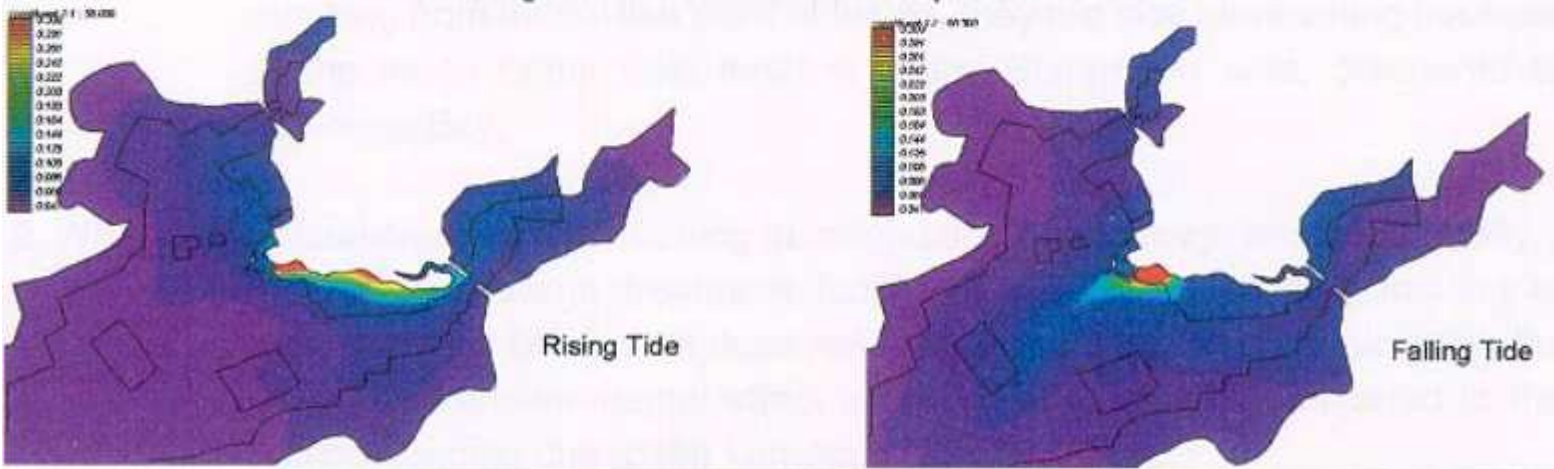
- **PRE-TREATMENT OF EFFLUENT.**
- **RE-LOCATE OUTFALL.**
- **IMPROVE DISPERSION.**
- **COMBINATION OF APPROACHES.**

# WHAT IF EFFLUENT WAS PRE-TREATED TO REDUCE NUTRIENTS?



**25%  
REDUCTION**

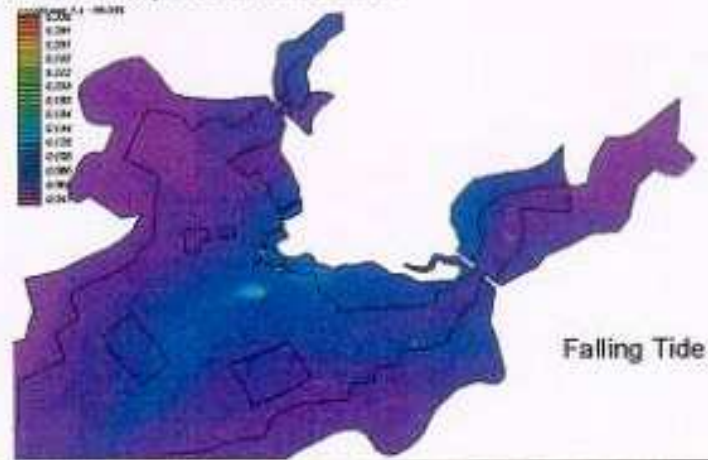
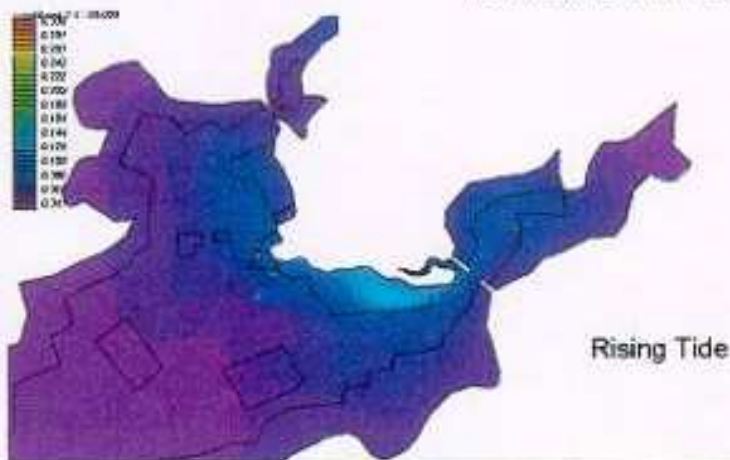
Existing Outfall Location at 50% Phosphorus Reduction



**50%  
REDUCTION**

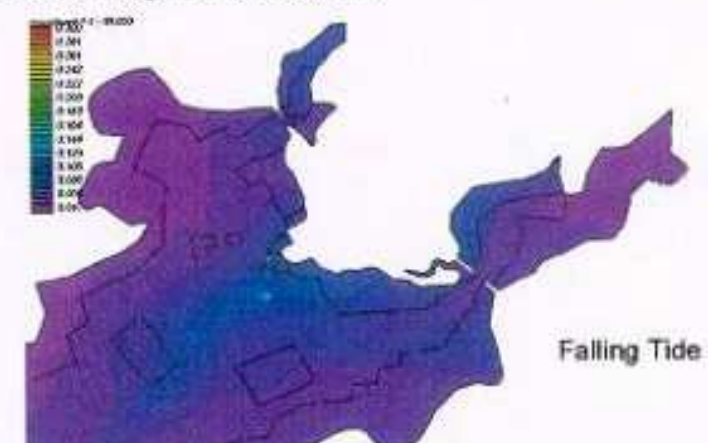
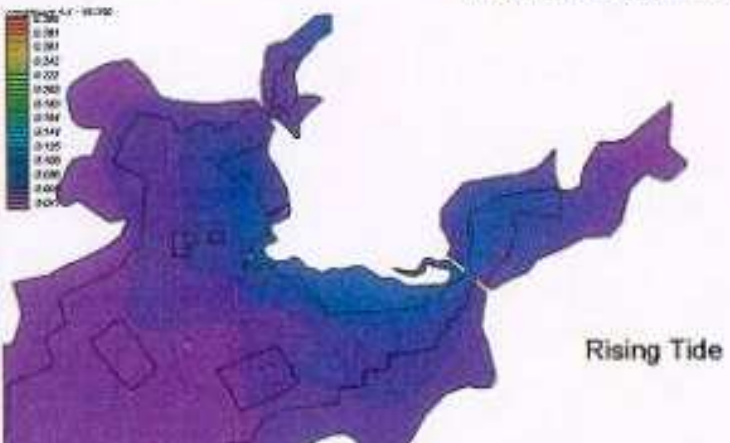
# WHAT IF EFFLUENT WAS PRE-TREATED AND OUTFALL WAS SHIFTED?

Potential Outfall Location 2 at 25% Phosphorus Reduction



**25%  
REDUCTION**

Potential Outfall Location 2 at 50% Phosphorus Reduction



**50%  
REDUCTION**

# **RECOMMENDATION #1**

- ❑ PRE-TREATMENT OF EFFLUENT WITH EXISTING OUTFALL WILL LIKELY BE INSUFFICIENT TO MEET PHOSPHORUS AND NITROGEN ASSIMILATIVE CAPACITY ISSUE.**
- ❑ REQUIRES:**
  - ❑ RE-LOCATION OF OUTFALL TO PROVIDE BETTER DISPERSION**
  - ❑ USE OF DIFFUSER END TO ACHIEVE BETTER DISPERSION**
  - ❑ PRE-TREATMENT TO REDUCE NUTRIENT LOADING**

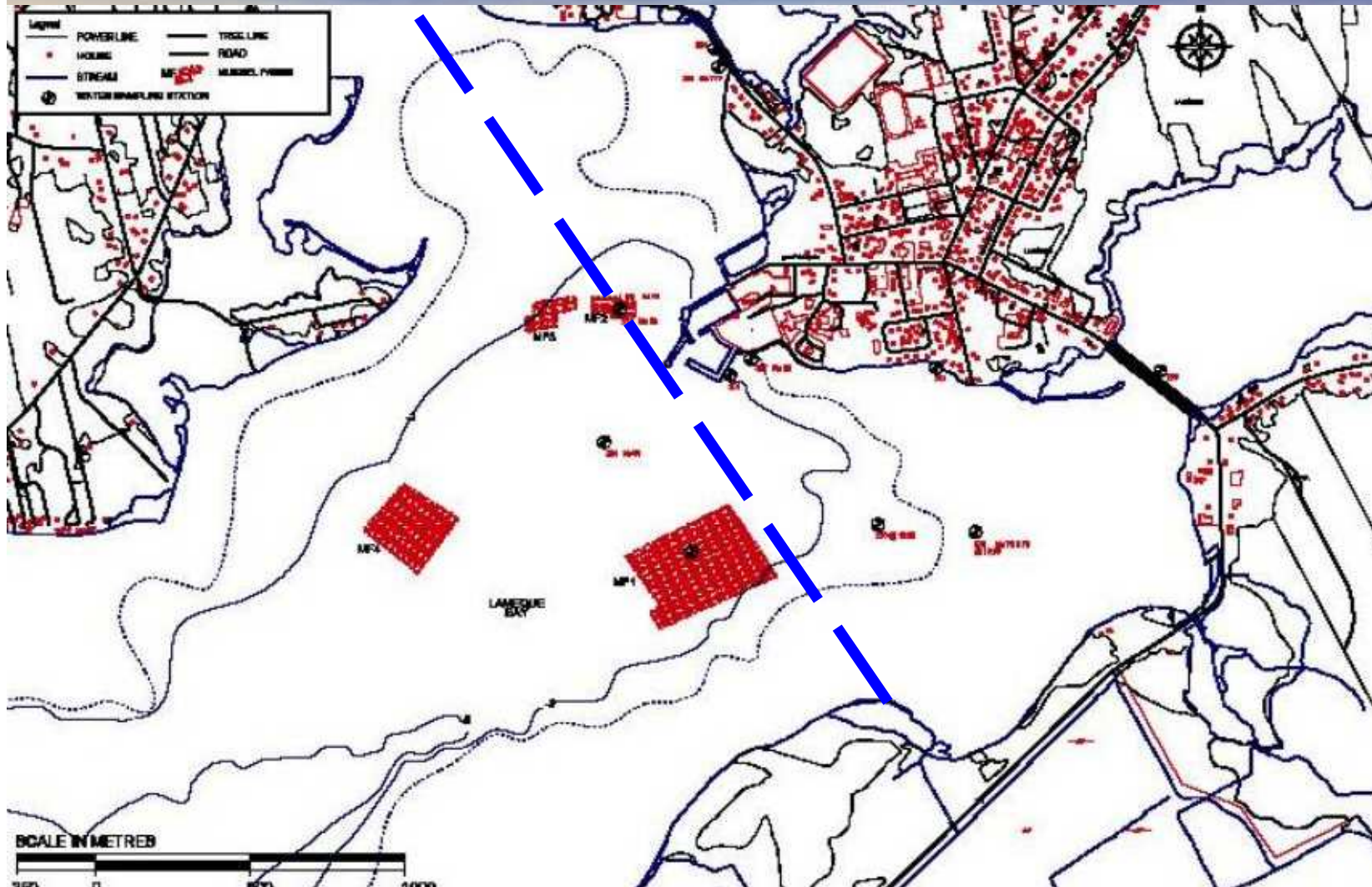
# WHAT OF OTHER NUTRIENT SOURCES?

- ❑ **RESERVOIR OF NUTRIENTS IN SEDIMENTS**
- ❑ **ROLE OF AQUACULTURE FACILITIES.**
- ❑ **SHIPPAGAN PROCESSING EFFLUENTS.**
- ❑ **SUBURBAN DEVELOPMENT WITH ON-SITE TREATMENT OF SEWAGE.**

## **RECOMMENDATION #2**

- ❑ DREDGE NUTRIENT-RICH SEDIMENTS TO REMOVE GROWTH RESERVOIR.**
- ❑ RE-LOCATION OF OUTFALL MAY REQUIRE SHIFTING OF AQUACULTURE LEASES DUE TO SHELLFISH REGULATIONS.**
- ❑ MUST ASSESS CONTRIBUTIONS TO NUTRIENT BUDGET OF BAIE DE LAMEQUE FROM AQUACULTURE LEASES.**

# 2003 POSITION OF SHELLFISH CLOSURE LINE AND AQUACULTURE LEASES





# **HOW TO RESOLVE MULTI-USER CONFLICTS?**

# **RECOMMENDATION #3**

- ❑ DEVELOP BAIE DE LAMEQUE ENVIRONMENTAL MANAGEMENT PLAN.**
- ❑ FORM BAIE DE LAMEQUE ENVIRONMENTAL MANAGEMENT ROUNDTABLE WITH ALL STAKEHOLDERS.**
- ❑ IDENTIFY OBJECTIVES AND TARGETS – WHAT DO TOWN AND BAY RESIDENTS WANT?**
- ❑ IDENTIFY MEASURES TO PROTECT ENVIRONMENT WHILE PROMOTING DEVELOPMENT.**
- ❑ DEVELOP AND CONDUCT MONITORING PROGRAM TO CONTINUE DEFINING QUALITY OF BAIE DE LAMEQUE.**

# **RECOVERY OF ECOSYSTEM WILL NOT BE WITHIN ONE YEAR**

- ❑ PLANNING, PERMITTING AND CONSTRUCTION OF RECOMMENDED WORKS WILL TAKE 10-24 MONTHS.**
- ❑ COLLECT AND CONTROL ACCUMULATION OF SEA LETTUCE.**
- ❑ CONTINUE TO MONITOR AND MANAGE SEA LETTUCE ISSUE.**

# **NEXT STEPS**

- ❑ CONDUCT STUDIES TO PROPERLY CHARACTERIZE COOP EFFLUENT AND WITH MODELING ENSURE PROPER SELECTION OF OUTFALL SITE AND PRE-TREATMENT.**
- ❑ ASSESS STATUS OF SALTMARSH AS ODOUR SOURCE, AFTER CHANGES TO COOP EFFLUENT AND SEA LETTUCE MANAGEMENT.**
- ❑ ASSESS ROLE OF AQUACULTURE FACILITIES ON CIRCULATION IN BAY AND AS SOURCE OF NUTRIENTS.**
- ❑ EVALUATE AND COST OPTIONS FOR REMOVAL OF NUTRIENT RESERVOIR – DREDGING, CAPPING, LONG-TERM SYSTEM RESTORATION.**

# LESSONS LEARNED

- ❑ **MARINE BIO-RESOURCE PROCESSING FACILITIES ARE MAJOR FOCUSED SOURCES OF NUTRIENTS AND OXYGEN-DEMAND MATERIALS.**
- ❑ **PRESENT SCALE AND EXTENT OF PROCESSING EFFLUENTS CREATE MAJOR ENVIRONMENTAL IMPACTS ON LOCAL MARINE WATERS.**
- ❑ **TO MEET CANADA'S COMMITMENT TO MANAGEMENT OF LAND-BASED SOURCES OF POLLUTION TO MARINE ENVIRONMENT, NUTRIENT LOADINGS MUST BE REDUCED.**
- ❑ **CONTINUATION OF MINIMALLY CONTROLLED DISCHARGES WILL INCREASE OCCURRENCES OF SEA LETTUCE ACCUMULATION AND OTHER SIGNS OF EUTROPHICATION.**

**MERCI**

