

The Gulf of Maine Summit State of the Environment Reporting
“From the Bottom Up”

Summary Reports and Matrices From United States and Canadian Regional Forums and Meetings



This Summary report was done as part of the “From the Bottom Up Regional Watershed Forums and Gulf of Maine Summit Project” in preparation for the Gulf of Maine Summit of October 26-29, 2004 in St. Andrews, New Brunswick. We gratefully acknowledge the support which enabled publication of this report from the Gulf of Maine Council on the Marine Environment and the U.S. Gulf of Maine Association.

Credit:

The map on the front cover was created by Richard D. Kelly, Jr., Maine State Planning Office, for the Gulf of Maine Council on the Marine Environment.

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Overview of the United States GPAC Forums and Related Meetings “From the Bottom Up” Project

In May 2001, the Global Programme of Action Coalition for the Gulf of Maine (GPAC) unanimously adopted “The Gulf of Maine State of the Environment Reporting From the Bottom Up” project as a new way to further public education about how to reduce the threats from land-based activities to the marine environment. The goal of these forums was to promote a general understanding of the Gulf’s well-being through a series of local participatory processes to create a “greater connection to and a sense of ownership of the Gulf of Maine ecosystem.” (1) GPAC Forum participants were asked to evaluate their watershed’s health as compared to 15 years ago.

GPAC was initiated and funded by the tri-national North American Commission for Environmental Cooperation from 1996 to 2000 as one of two pilot projects to see how best to implement the Global Programme of Action to Protect the Marine Environment from Land Based Activities (GPA) which was adopted by 106 nations in 1995. The First Intergovernmental Review Meeting of the GPA in November 2001 recognized GPAC as the best implementation project of the GPA in the world.

The GPAC Regional Watershed Forum Planning Committee met several times between 2001-2003 to ensure coordination and consistency in planning and execution of these forums. Identification of local convening organizations, the forum convener’s handbook, the three basic questions to be asked, and the matrix are four products of this group.

There were five GPAC forums held in the United States in 2002 and 2003:

- US Gulf of Maine “Protecting our Coastal and Offshore Waters” (November 1, 2002)
- Blue Hill Bay to Taunton Bay, Maine “Common Water - Common Ground - Acadian Regional Watershed Forum”(November 8, 2002)
- Hancock County (ME) Youth Forum “It’s Our Watershed Too” (November 7, 2002)
- Washington County, Maine GPAC Watershed

Forum” (January 17, 2003)

- Penobscot Bay, Maine “Working Toward the Future” (February 1, 2003)

Other related meetings in the Gulf of Maine region reported on in this report include:

- Boston Harbor Islands Science Symposium: Boston Harbor Islands National Park (October 7, 2003)
- State of the Estuaries Conference: New Hampshire Estuaries Project (October 21, 2003)

Summaries of two meetings in Massachusetts held outside the Gulf of Maine region are included since they dealt with some of the same marine/watershed issues:

- Buzzards Bay, Massachusetts “State of the Bay 2003” (November 22, 2003)
- Mt. Hope Bay, Massachusetts/Rhode Island “The Mt. Hope Bay Symposium” (May 10, 2003)

CONCLUSIONS FROM THE MATRICES ABOUT THE STATE OF THE US GULF OF MAINE

1. Out of the 18 indicators in six regions (108 in all), there were four indicators in two regions ranked as “good” (green).
2. The *Water Quality* section had the fewest “definite problem” (red) rankings. However, there were specific locations with definite, but varying, issues of concern in each region.
3. The *Changes in Species* section had the most “definite problem” (red) rankings.
4. The issues of most concern were:
 - *Populations, Dominance, and Clearing and Development of Natural Areas* were tied with three “red” rankings.
 - *Spawning & Nursery Areas* and *Invaders* were tied with 2 “red” rankings.
5. Massachusetts and New Hampshire have taken many actions in the last 15 years to improve their watersheds and coastal areas.

CONCLUSIONS ABOUT THE GPAC FORUM PROCESS:







What did not work with the Forum process?

1. Conveners and participants had varying degrees of knowledge about the questions asked and matrix issues, making it a very hard task.
2. The forums took place over too short a time to explore such complex issues adequately.
3. Some organizations did not choose to participate due to overloaded agendas, lack of funding, or the conclusion that convening a Forum was not in their interest. Thus, all areas in the US Gulf of Maine region were not covered.

What did work with the Forum process?

1. Confirmed GPAC's belief that local knowledge and caring about the shared marine environment are key resources to ensure future protection.
2. Even though some forum participants lacked a marine or watershed ecology science background, living and observing watershed and marine activities gave them a uniquely valuable view of the state of their regional watershed area which they were able to share. Their knowledge of geographic areas of concern or issues, when coupled with scientific data, will help decision makers prioritize management decisions to reduce risks.
3. The participants had a chance to hear from regional experts working on the watershed, marine and Gulf of Maine issues in their area
4. In two regions, participants established two new organizations to work on watershed and marine issues.
5. By holding the forums in a regional location, we involved participation from sectors not normally involved or interested in Gulf of Maine issues.
6. There was significant new knowledge shared across sectors (business, non-governmental organizations, and government) and media (land/air/freshwater/marine).
7. The common questions and common matrix, even though answered with such a varied knowledge base, give an insightful "risk communication" and "comparative risk" baseline on Gulf-wide issues. Being able to see how the issues ("risks") are compared, evaluated, and communicated is a valuable tool for decision makers.
8. Some of the innovative actions reported in the Forums and meetings, when shared in these Summary reports, on the website, and at the

MATRIX COLORS AND SYMBOLS

-  (Red): Definite problem
-  (Orange): Definite to moderate problem
-  (Yellow): Moderate problem
-  (Light green): Moderate to no problem
-  (Green): No problem
-  (White): No answer in that category
- DK:** Not enough data
- NA:** No answer/not applicable
- ?:** Unsure

Black type inside a matrix box: subregion or issue that is noteworthy

Special Note: The matrix colors chosen by these forums, groups and individuals are based on a combination of data, local knowledge and observation, family history, and best personal and/or professional judgment.

Gulf of Maine Summit, can provide new ways to proceed throughout the Gulf, assuring even better management and stewardship.

GPAC wishes to express its deep appreciation for the support given in the United States to this project by our national, regional, and state governments and non-government organizations. The US National Oceanic and Atmospheric Administration gave funding for the coordinator and some of the forums. The Maine Coastal Program and the Gulf of Maine Council gave additional funding for the Maine forums and coordinator. The Massachusetts Coastal Zone Management Program and New Hampshire Coastal Program contributed both in-kind and other resources for the meetings in their jurisdictions. The Marine Environmental Research Institute (MERI), the Salmon Habitat and River Enhancement Project (SHARE), the Mount Desert Island Water Quality Coalition (MDIWQC) and the Penobscot Bay Network contributed significant in-kind and financial resources for their four forums. Many government agencies and non-government organizations provided support for the Canadian forums.

*Pamela W. Person
US GPAC Chair & US GPAC Forum Coordinator
March 29, 2004*

Summary: United States GPAC Matrices

Indicator		U.S. GOM	MA	NH	Penobscot Bay	Blue Hill to Taunton Bay	Washington County
Water Quality	Bacteria	(1)					
	Nutrients						
	Sediments						
	Toxic Contaminants					(6)	
Presence of Critical Habitats or Natural Areas	Benthic Habitat	(2)			?		
	Wetlands	NA					
	Seagrass						
	Nesting & Foraging Areas	(3)	DK				
	Spawning & Nursery Areas						
Changes in Species	Populations	Taxa (4)			Taxa (5)		
	Diversity	?		NA			
	Dominance		NA	NA			
	Invaders	?					
Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas						
	Erosion and Deposition						
Changes in Resource Use	Shift in Target Species						
	Species Introduction	? Offshore	?				

FOOTNOTES:

From the Gulf of Maine US Forum Matrix

- (1) Bacteria divided into human pathogens and harmful algae blooms
- (2) Benthic habitat divided into intertidal soft, intertidal hard, nearshore, and offshore
- (3) Nesting & Foraging divided into mainland and coastal island
- (4) Populations divided according to taxa: algae, seagrasses, plankton, invertebrates, fish, birds, and mammals. Some further divided by use.

From the Penobscot Bay Forum Matrix

- (5) Populations divided into the following taxa: fish, shellfish, birds, mammals, and plants

From the Blue Hill-Taunton Bay Forum Matrix

- (6) Red except for Taunton Bay, which was green

UNITED STATES GULF OF MAINE: COASTAL AND OFFSHORE

Protecting our Coastal and Offshore Waters GPAC Forum

Location: Blue Hill, Maine

Date: November 1, 2002

Convener:

Dr. Susan Shaw, Executive Director
Marine Environmental Research Institute
55 Main Street, P.O. Box 1652
Blue Hill, Maine 04614
www.meriresearch.org
Telephone: 207-374-2135

There is a full Summary report of this Forum available on line at www.meriresearch.org

- *Number of Attendees:* 51 representing scientists, state and national agencies, non-governmental organizations, and businesses. Several hundred invitations (mail and email) were sent within region.
- *Media coverage:* public education: Local and regional print and television coverage before and at the event. MERI also used many different organizations' list serve connections, including many that were not Gulf of Maine related.
- *Was there good exchange of information from the public to scientists and scientists to public?* This was more of a forum of "experts" from the various sectors.
- *As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?* Yes, but most attendees were experts who already had this knowledge.
- *As a result of forum, do more public and land-based managers understand concept of the "water cycle" than before?* Yes, but most attendees were experts who already had this knowledge.
- *Any follow-up activities?* Many participants already work together on GOM Council/GPAC/Seagrant/NOAA projects but better cross-connections were established among attendees.
- *How was the matrix completed?* Breakouts by sections of the matrix.

Key Priority Issues Identified for the U.S. Gulf Of Maine (see matrix)

The "severe" problems noted that were Gulf-wide were:

1. **Water quality:** toxic contaminants in tissue in coastal and estuarine areas; human pathogens associated with sewage, harmful algal blooms in all areas.
2. **Severely impacted habitats and species:** benthic habitat, seagrass, wetlands, breeding and spawning areas due to direct and indirect impacts of coastal development and human on-shore and offshore activities.
3. **Changes in resource use:** shifts in targeted species, loss of fisheries diversity, influx of finfish aquaculture, invasive species and impacts from tourism and recreation

Special Note: Those present felt the matrix exercise was a constructive exercise. However, several limitations were noted: lack of time; gaps in knowledge; inaccuracies of the process; and incomplete or missing knowledge due to some experts not being at the Forum.

MAJOR CONCLUSIONS

1. To produce an ecosystem health assessment, scientists need to continue to organize large amounts of historical and recent data across scales and between disciplines and sectors.
2. Recognition that "top-down" strategies to protect the Gulf environment will ultimately fail if not accompanied by "on-the-ground" support and resource commitment.
3. Need to continue to build multi-sector networks across jurisdictions and increase awareness and participation.
4. Need to build political will to support actions at all levels.

United States Gulf of Maine: Coastal and Offshore

Indicator		GOM	MA	NH	Maine	Basin
Water Quality	Microorganisms: Human Pathogens					?
	Microorganisms: Harmful Algal Blooms					
	Nutrient Concentrations				Better in W. Maine	
	Nutrients - Dissolved Oxygen				Better in E. Maine	?
	Sediments				Better in E. Maine	?
	Toxic Contaminants					
	Temperature & Salinity	?				

Presence of Critical Habitats or Natural Areas	Benthic: Intertidal Soft					
	Benthic: Intertidal Hard	?				
	Benthic: Nearshore		Might be better?			
	Benthic: Offshore					
	Wetlands					
	Seagrass					
	Nesting/Foraging: Mainland					
	Nesting/Foraging: Island					
	Spawning/Nursery					
	Riparian					

Matrix continued on next page

United States Gulf of Maine: Coastal and Offshore

Matrix continued from previous page

Indicator		GOM	MA	NH	Maine	Basin
Changes in Species	Populations <i>Algae</i> (1)					
	<i>Seagrasses</i> (2)					
	<i>Plankton</i> (2)	?				
	<i>Invertebrates</i> (1)					
	<i>Invertebrates</i> (2)					
	<i>Fish</i> (1)					
	<i>Fish</i> (2)					
	<i>Birds</i>					
	<i>Mammals</i>					
	Diversity	?				
	Dominance					
	Invaders	?				
Changes in Use and Integrity of Water and Riparian Zones	Clearing of coastal vegetation				Better in E. Maine	
	Erosion and Deposition				Good in E. Maine	
	Percent Watershed Paved				Better in E. Maine	
	Pollution related to land use change					
Changes in Resource Use	Shift in Target Species					
	Species Introduction	? Offshore	? Offshore	? Offshore	? Offshore	
	Recreation/Tourism				? Offshore	

FOOTNOTES:

- (1) Commercially or recreationally important species
- (2) Non-harvested species

BOSTON HARBOR, MASSACHUSETTS

Boston Harbor Islands Science Symposium

This symposium was not a GPAC regional watershed forum. However, some of the topics discussed include issues evaluated in the bi-national assessment “From the Bottom Up” Regional Watershed Forums and Gulf of Maine Summit Project. The Massachusetts GPAC matrix was filled out by six staff members of Massachusetts Coastal Zone Management and Massachusetts Bays Estuary Program.

Location: Museum of Science, Boston, MA

Date: October 7, 2003

Conveners:

Bruce Jacobson
Assistant Superintendent
Boston Harbor Islands National Park (BHINP)
(617) 223-8669
bruce_jacobson@nps.gov

Dan Hellin, Specialist
Coastal Management and Marine Biology
Urban Harbors Institute – U Mass Boston
University of Massachusetts Boston
100 Morrissey Boulevard, Boston, MA 02125
(617) 287-5570
dan.hellin@umb.edu, www.uhi.umb.edu

- *Number of Attendees:* 80: mostly scientists and agency personnel. Several thousand invitations were sent within the region.
- *Media coverage:* Local and regional print coverage before and at the event.
- *Was there good exchange of information from the public to scientists and scientists to public?* This was a forum of experts who provided updates on their research relevant to the Boston Harbor Islands.
- *As a result of the Conference, do more public and land-based managers understand the concept of “water cycle” than before?* Not applicable to this Symposium
- *As a result of the Conference, do more members of the general public and land-based managers understand the concept of the Gulf of Maine watershed?* Not applicable to this Symposium.
- *How was the matrix completed?* No matrix was produced. This was not a GPAC forum.

A Boston Harbors issue of the *Northeastern Naturalist* will include articles from several presenters.

Many presentations at the Symposium related to the GPAC project and Gulf of Maine Summit:

- **Intertidal habitat inventory of BHINP Area:** (National Park Service/New England Aquarium and Massachusetts Audubon) The Boston Harbor Islands Intertidal Classification System was developed for mapping substrate and biotic assemblage types. 13 substrate and 32 biotic assemblages were mapped. In addition, the inventory revealed 95 species of invertebrates, 70 marine algae, 15 vascular plants and 3 fungi. The inventory will provide a foundation for natural resource management decisions as well as help design a long-term monitoring program.
- **Harbor Improvements:** (Taylor, EQ Dept, MA Water Resource Authority) Since Wastewater discharges were ended 9/00 there has been a 50% decrease in concentrations of nitrogen and phosphorus in most of the Harbor area. Phytoplankton quantities have decreased by one-third mainly in the summer and in the North Harbor. The Harbor has shown a 10% increase in water clarity and 10% increase in bottom-water dissolved oxygen. Dr. Eric Adams from MIT spoke about the transport of dissolved and suspended contaminants in Boston Harbor.
- **NPS Inventory and Monitoring Programs: Developing long term ecological monitoring in the northeastern coastal Parks:** (Shriver, NPS) Intent to track a subset of indicators of physical, chemical and biological elements and processes of ecosystems that represent the overall health of the park resources.
- **Distribution and Abundance of Birds during Breeding season in Boston Harbor:** (Paton/Harris/Trocki, DNR, Univ. RI) Their study found 136 species of which 67 were suspected of breeding and 50 species of migratory birds.
- **Vascular plant surveys of the BHINP:** (Elliman) 509 species of plants in 99 plant families found in 2001-2002 survey. Duration and type of human use help determining present condi-

United States: Massachusetts

- tion of flora. Also have surveyed and mapped upland vegetation communities.
- **Historic description of the vegetation of the Boston Harbor Islands:** 1600-1900 (Richburg & Patterson, DNR, UMass Amherst) Dramatic changes in vegetative structure and composition since 1600 due to use and then abandonment by humans.
 - Patterson/Richburg/Clark spoke on the **Recent Paleoecology of Calf Island** telling about landscape processes as seen in vegetative core samples over the past 1500 years.
 - Manning spoke about using sentinel **Bioindicator Plants for ambient Ozone**.
 - **Effects of rising sea level on Boston Harbor Islands:** (Fitzgerald, Earth Sciences, Boston Univ./Rosen, Geology, Northeastern Univ.) Boston harbor contains one of the few drumlin coasts in the world. With accelerated sea level rise and exposure to storm wave energy, bluff erosion will increase.
 - **Geophysical survey and island archeology** presentation by Pendery said that erosion is the largest threat to island archeological resources.
 - **Visitor Carrying Capacity:** (Manning/Leung/Budrik) suggest basing decisions on inventory of recreation-related resources and visitor surveys to the open islands.
 - **Marine Bioinvaders in the Gulf of Maine:** (Pederson/MIT Seagrant) In the August 2000 survey of 20 Massachusetts harbors and marinas, 29 introduced plant species and 32 cryptogenic species of unknown origin. Species arrive via ship ballast, aquaculture, research and education, bait, seafood and other human vectors.
 - **Stellwagen Bank National Marine Sanctuary; Site Characterization for Management Plan Review:** (MacDonald, SBNNMS) NMS was established in 1992 because of its remarkable biological, geological, oceanographic, and cultural features. To determine the success of management, use of remote technologies, oceanographic vessels to gather data. GIS is used to show research results. Sanctuary is viewed as a model for the Gulf of Maine.

Massachusetts Matrix

The Massachusetts GPAC matrix was filled out by six staff members of Massachusetts Coastal Zone Management and Massachusetts Bays Estuary Program.

Indicator		MA Coast	MA and Cape Cod Bays	Boston Harbor
Water Quality	Bacteria	Yellow	Yellow	Red
	Nutrients	Yellow	Green	Green
	Sediments	Yellow	Green	Red
	Toxic Contaminants	Yellow	Yellow	Yellow
	Harmful Algal Blooms	Green	Green	Green
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow	Green	Yellow
	Wetlands	Green	Yellow	Red
	Seagrass	Yellow	Red	Red
	Nesting & Foraging Areas	?	?	?
	Spawning & Nursery Areas	Yellow	Yellow	Red
Changes in Species	Populations	Red	Red	Red
	Diversity	Yellow	Yellow	Yellow
	Dominance	NA	NA	NA
	Invaders	Yellow	Yellow	Yellow
Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas	Red	Red	Red
	Erosion and Deposition	Yellow	Yellow	Green
Changes in Resource Use	Shift in Target Species	Yellow	Yellow	Yellow
	Species Introduction	?	?	?

NEW HAMPSHIRE ESTUARIES

State of the Estuaries Conference - Research in the Great Bay Estuary: Developing an Integrated Framework to Advance Our State of Knowledge

This symposium was not a GPAC regional watershed forum. However, some of the topics discussed include issues evaluated in the bi-national assessment "From the Bottom Up" Regional Watershed Forums and Gulf of Maine Summit Project. The New Hampshire matrix was filled out by five members of the New Hampshire Estuary Project in October 2003.

Location: Yokens Conference Center, NH

Date: October 21, 2003

Conveners:

New Hampshire Estuaries Project
152 Court Street, Suite 1
Portsmouth, NH 03801
www.state.nh.us/nhep

- *Number of Attendees:* 200
- *The State of the Estuaries 2003* report was issued at the Conference. The full report is available on the NHEP website www.state.nh.us/nhep.
- There were many presentations at the Conference given by the following speakers:
 - Opening remarks by Lee Perry, NH Fish & Game Executive Director
 - Developing a Strategic Plan for Research in the Great Bay Estuary: Brian Smith, NH Fish & Game
 - An Ecosystem Approach to Estuarine Science: Perspectives from the US Commission on Coastal Ocean Policy: Paul Sandifer, Senior Scientist, National Centers for Coastal Ocean Science, NOAA
- *Was there a good exchange of information from the scientists to the general public?* There were speakers to the full plenary sessions as well as breakouts.
- *As a result of the Conference, do more public and land-based managers understand the concept of "water cycle" than before?* The State of the Estuaries report gave very good information about the threats from land-based activities.
- *As a result of the Conference, do more members of the general public and land-based managers understand the concept of the Gulf of Maine watershed?* Not applicable.

- *How was the matrix completed?* The matrix was completed on a separate day by a small group of scientists and coastal managers. The extensive State of the Estuaries report was produced which can be found on the NHEP website noted above.

KEY INDICATOR FINDINGS IN THE STATE OF ESTUARIES (NH) 2003 REPORT COMPARED TO TEN YEARS AGO

1. Bacteria: fecal coliform bacteria levels have decreased in Great Bay.
2. Toxic contaminants: PCBs and DDT have decreased, PAHs have increased, metals, including mercury, have remained about the same.
3. Nitrogen and other nutrients: levels have increased particularly at Adams Point and the Lamprey River no significant changes in Squamscott River.
4. Dissolved oxygen: very seldom do the levels fall below the NH state standard and only at Lamprey River monitoring site.
5. Levels of harvestable oysters: declined dramatically, possibly due to protozoan pathogens.
6. Levels of harvestable clam density in Hampton-Seabrook flats: densities lower than average
7. Eelgrass habitat: habitat has remained relatively constant.
8. Coastal land protected from development: 8.4%
9. Large, protected, unfragmented land blocks in NH's coastal watershed: very few, only 9.6% of blocks over 1,000 acres.
10. Percentage of New Hampshire's coastal watershed covered by impervious surfaces: 6.8% but it is not evenly distributed. Between 1990-2000, 11,154 acres of impervious surfaces were added.
11. Is NH's coastal watershed experiencing "sprawl"? Yes.

New Hampshire Matrix

Five members of the New Hampshire Estuary Project met in October 2003 to complete the New Hampshire GPAC Matrix.

Indicator		New Hampshire	Great Bay	Coastal	Hampton
Water Quality	Bacteria	Yellow	Yellow	Yellow	Yellow
	Nutrients	Yellow	Yellow	Green	Green
	Sediments	Green	Yellow	Green	Green
	Toxic Contaminants	Yellow	Yellow	Yellow	Yellow
	Harmful Algal Blooms	Green	Green	Light Green	Light Green
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow	Yellow	Yellow	Yellow
	Wetlands	Yellow	Yellow	Yellow	Yellow
	Seagrass	Green	Green	Green	Green
	Nesting & Foraging Areas	Yellow	Yellow	Yellow	Yellow
	Spawning & Nursery Areas	Yellow	Yellow	Light Green	Light Green
Changes in Species	Populations	Orange	Red	Yellow	Red
	Diversity	NA	NA	NA	NA
	Dominance	NA	NA	NA	NA
	Invaders	Orange	Orange	Orange	Orange
Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas	Red	Red	Red	Red
	Erosion and Deposition	Yellow	Green	Watershed Paved (%)	Green
Changes in Resource Use	Shift in Target Species	Yellow	Green	Red	Green
	Species Introduction	Green	Green	Green	Green

PENOBSCOT BAY, MAINE

Working Toward the Future GPAC Forum

Location: Penobscot Marine Museum, Searsport, ME

Date: February 1, 2003

Conveners:

Planning Committee, Penobscot Bay Network
Steve Miller, President of Pen Bay Alliance
Islesboro Land Trust
P.O. Box 182, 376 West Bay Road
Islesboro, ME 04949
207-734-6907

- *Number of Attendees:* 42 representing local and state governments; terrestrial and marine environmental organizations; land trusts; research community; and businesses. 200 mailed invitations and hundreds via list serves.
- *Media coverage – public education:* Local print coverage. Planning Committee also used many different organizations' list serves.
- *Was there good exchange of information from the general public to scientists and scientists to public?* There was good exchange, but the "citizens" did not have enough knowledge base to completely understand the matrix terms.
- *As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?* Yes.
- *As a result of forum, do more public and land-based managers understand concept of the "water cycle" than before?* Yes
- *How was the matrix completed?* By sections of the matrix
- *Any follow-on activities?*
 - One of the objectives was to discuss forming an advocacy organization for Penobscot Bay. People started meeting soon after the Forum and discussing how to organize.
 - The Pen Bay Alliance filed incorporation papers in January 2004 and has a 15-member Board of Directors.
 - The Pen Bay Alliance is developing information and a public awareness campaign about possible uses for Sears Island, the largest undeveloped island in Penobscot Bay.

Key Priority Issues Identified for Penobscot Bay

1. **Water Quality:** The River and Western Bay have poor water quality. The Islands and Eastern Bay have better water quality. Hot spots were identified and need to be focused on. There are gaps in knowledge about water quality.
2. **Presence of Critical Habitats or Natural Areas:** Wetlands are scarce and poorly protected. Time scale of 15 years was hard. Desire to discuss upland habitats rather than aquatic.
3. **Changes in Species:** How is the food chain changed by predator-prey relationships? The effects of toxins on the change in species. The physical/biological changes in habitats bring about changes in species. Many data gaps.
4. **Changes in Use and Integrity of Water and Riparian Zones:** Regulation is all right but enforcement is not done. Economic development is seen as a bonfire in front of a glacier. Private land conservation protects areas.
5. **Changes in Resource Use:** Patterns of development (Sprawl) is biggest challenge with multiple effects and need to appropriately assess the costs. There is more conservation land but less natural/undeveloped land. Fiscal instability in forest products industry has led to many land and resource use changes in last 15 years.

MAJOR CONCLUSIONS

1. There needs to be spatially correct information for fisheries management.
2. Fisheries management and coastal management need to be combined.

These conclusions were drawn by Ann Hayden, Director of the NOAA-funded Penobscot Bay Research Project in the 1990's, which led to significant new knowledge. The NESDIS Satellite Ocean Remote Sensing and Compact Airborne Spectral Imaging used by the Project gave vital data to state agencies, non-government organizations, fishermen and research community, enabling them to work together.

3. A snapshot of a region is valuable if it is part of a long-term commitment to monitor that region to keep track of what's happening to the people, natural resources, economy and natural systems we all depend on.

This conclusion was drawn by David Platt, editor of "The Penobscot, the Forest, River and Bay" (Island Institute, 1996).

Penobscot Bay, Maine, Matrix

Indicator		Penobscot Bay	Western Bay	Penobscot R & Upper Bay	Eastern Bay	Islands & Lower Bay
Water Quality	Bacteria	Yellow	Yellow	Red	Light Green	Dark Green
	Nutrients	Yellow	Orange	Red	Dark Green	Dark Green
	Sediments	Light Green	Yellow	Red	Light Green	Dark Green
	Toxic Contaminants	Yellow	Yellow	Red	Orange	Dark Green

Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow with ?				
	Wetlands	Red				
	Seagrass	Orange				
	Nesting & Foraging Areas	Red				
	Spawning & Nursery Areas	Red				

Changes in Species	Fish Populations	Orange	Red	Orange	Red	Red
	Shellfish Populations	Orange	Yellow	Orange	Orange	Orange
	Bird Populations	Red	White	Red	Orange	Red
	Mammal Populations	Red	White	Red	Orange	Red
	Plant Populations	Red	White	Red	Orange	Red
	Diversity	Orange	Yellow	Orange	Orange	Orange
	Dominance	Red	White	Red	Orange	Red
	Invaders ¹	Yellow with ?	Yellow	Red	Orange	Red

Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas	Red	Red	Red	Red	White
	Erosion and Deposition	Orange	Orange	NA	Orange	NA

Changes in Resource Use ²	Shift in Target Species	Red with ? Urchins	Yellow	Orange	Orange	Aquaculture
	Species Introduction	Orange	White	Orange	Orange	Red

FOOTNOTES:

(1) Green crab and teredo worm

(2) The group discussing "Changes in Resource Use" wanted to emphasize the intersecting adverse impacts from sprawl on the Penobscot Bay area: social, cultural, physical, economic, and environmental.

HANCOCK COUNTY, MAINE (YOUTH)

Its Our Watershed Too! Youth GPAC Forum

Location: Blue Hill, Maine

Date: November 7, 2002

Convener:

Dr. Jane Disney, Director
Mt. Desert Island Water Quality Coalition
P.O. Box 911, Mt. Desert, ME 04660
207-288-2598

- *Number of Attendees:* 48 students plus teachers and other adults. There also were Environmental Education students from College of the Atlantic that helped facilitate the groups and lead various events. Invitations were sent to all schools from grades 4-12 in Hancock County.
- *Media coverage – public education:* Local and regional print and television coverage before and at the event. Good MDIWQC newsletter and website information about forum.
- *Was there good exchange of information from the students to scientists and from scientists to students?* The student groups had been invited months in advance, given the set of GPAC forum questions, and classes and individuals had done projects concerning the land-marine connections and threats. The students had time during the forum to display their projects. There was an opening ceremony led by a Penobscot Nation leader, several watershed awareness activities that taught how to do land use planning and water quality analysis and riparian planting.
- *As a result of forum, do more students understand the concept of the Gulf of Maine watershed than before?* Yes.
- *As a result of forum, do the teachers and students understand concept of the “water cycle” than before?* Yes particularly due to the hands-on activities during the forum.
- *How was the matrix completed?* The students held Round Table Discussions of the Issues and the whole group held a Clean Water Congress at the end. Although the matrix was not completed, the issues defined were the same.
- *Any follow-on activities?* There was second Youth Forum on May 20, 2004.

Key Priority Issues

Identified by students for Hancock County, Maine, in 7 roundtable discussions of 7-8 students each from grades 4-12.

1. **Runoff (Non Point Source Pollution):** 5 of 7 groups commented on runoff as a priority issue. The other two groups listed runoff but did not prioritize this issue. Runoff sources they mentioned included: parking lots; urban runoff; fertilizers used on vegetable, tree and blueberry farms; nutrients from cattle and salmon farms; pesticides; and fecal coliform
2. **Boaters:** 5 of 7 groups identified “boaters” as a priority issue affecting water quality due to: overboard discharge and sewage, throwing left-over bait and trash into waters,
3. **Litter:** 2 of 7 groups identified trash as a priority (5 other groups that cited trash from boats).
4. **Erosion or Siltation:** This was a priority issue for 2 groups.
5. **Clearing land for development/deprivation of vegetative buffers:** Students felt vegetative buffer loss was a key issue in their watershed.
6. **Lack of Awareness (globally and locally):** This was a priority issue for five students in one group.
7. **Trawling:** One group listed disruption of the ocean floor as an issue affecting their watershed.
8. **Drought/Weather:** 7 students in one group identified current drought as biggest issue -- heavy usage of aquifers. One group cited weather as an issue -- effects on watershed of weather events “Hurricanes/tornadoes/global warming/ozone depletion.”
9. **Drinking water:** Issue for one group.
10. **Dumps/Junkyards:** Issue for one group as leaching oil and other contaminants.
11. **Mills and Industrial waste:** Priority issue for one group
12. **SUVs:** “Gas and destroying habitat were viewed as an issue in the watershed.”
13. **Acid Rain:** Mentioned by 2 groups, prioritized by 1 that had noticed lower Ph in their water sampling.
14. **Invasive Species:** Discussed by 4 of 7 groups but not prioritized by any. Included milfoil from boats from out of area.

BLUE HILL BAY TO TAUNTON BAY, MAINE

Common Water-Common Ground-Acadia Regional GPAC Watershed Forum

Location: Blue Hill, Maine

Date: November 8, 2002

Convener:

Pamela Person, US GPAC Chair and 17 member multi-sector planning committee
479 Back Ridge Road, Orland, ME 04472
207-469-6770

- *Number of Attendees:* 76 representing local, state and national governments; non-governmental organizations such as bay associations, watershed associations, water monitoring associations, fishermen, land trusts; and businesses. 250 mailed invitations and hundreds via list serves were sent.
- *Media coverage – public education:* Local and regional print and television coverage before and at the event. Planning Committee used listserv connections and newsletters before and after the event.
- *Was there good exchange of information from the general public to scientists and scientists to public?* There was excellent exchange, but the ‘citizens’ did not have enough knowledge to fully understand the matrix terms. There were displays from 23 organizations at the Forum.
- *As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?* Yes, there has been continuing feedback to convener about how much they learned and the value of understanding the larger Gulf of Maine watershed.
- *As a result of forum, do more public and land-based managers understand concept of the “water cycle” than before?* Yes. It has led to more workshops by several agencies and non-government organizations about land/water/air connections.
- *How was the matrix completed?* By sub-watershed – Blue Hill Bay, Union River Bay, Frenchman Bay, Taunton Bay.
- *Any follow-on activities?*
 - The Forum Planning Committee developed the idea of a concurrent “Its My Watershed Too” Youth Forum, which was held the day before (see Youth Forum summary). A Youth Forum was also held in May 2004.
 - Many new, shared events have taken place, such

as Planning for Prosperity in Hancock County, and Maine Audubon/Hancock County Soil and Water Commission/Union River Watershed Coalition “Beginning with Habitat” workshops.

- A Watershed and Habitat Protection Committee was formed on Mount Desert Island.
- In February 2004, a Water Quality Coalition for Blue Hill Bay was founded by Forum attendees: Marine Environmental Research Institute, Blue Hill Heritage Trust, Friends of Blue Hill Bay, and Blue Hill Harbor Association getting help from other attendees.

Key Priority Issues

1. Most area-wide indicators were between Definite (red) and Moderate (yellow) (shown as orange).
2. Union River Bay and Frenchman Bay had the most “definite” problems identified.
3. “Water quality - Toxic Contaminants” was “Definite (Red)” in all but Taunton Bay area.
4. “Water quality – Bacteria” was “Definite (Red)” in Union River Bay and Frenchman Bay.
5. “Changes in Species–Populations” was “Definite (Red)” in Blue Hill Bay and Frenchman Bay
6. “Changes in Species – Invaders” was “Definite” in Union River Bay and Frenchman Bay.
6. “Clearing and Development of Natural Areas” was “Definite” in Union River Bay and Frenchman Bay.

MAJOR CONCLUSIONS

1. The major threat to this regional watershed was from non-point source pollution (erosion, bacteria & nutrients) due to cumulative watershed/shoreline development.
2. Working together is key to protecting our natural heritage, fisheries and tourism economies
3. Persistent pollutants in the ground, sediments and airborne deposition threaten larger mammal/human species.
4. Other threats were from mine runoff, dragging, long-range air transport of pollutants, climate change and dredging.

Blue Hill Bay to Taunton Bay, Maine, Matrix

Indicator		Blue Hill Bay to Taunton Bay	Blue Hill Bay	Union River Bay	Frenchman Bay	Taunton Bay
Water Quality	Bacteria	Orange	Orange	Dark Red	Dark Red	Light Green
	Nutrients	Orange	Orange	Orange	Dark Red	Dark Green
	Sediments	Orange	Orange	Orange	Dark Red	Light Green
	Toxic Contaminants	except Taunton Bay	Dark Red	Dark Red	Dark Red	Light Green
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Orange	Orange	Orange	Dark Red	Yellow
	Wetlands	Yellow	Yellow	Yellow	Dark Red	Light Green
	Seagrass	Orange	?	Orange	Orange	Yellow
	Nesting & Foraging Areas	Yellow	Yellow	Yellow	Orange	Light Green
	Spawning & Nursery Areas	Orange	Orange	Dark Red	Orange	Orange
Changes in Species	Populations	Dark Red	Dark Red	Orange	Dark Red	Orange
	Diversity	Orange	Orange	Orange	Orange	Orange
	Dominance	Orange	Yellow	Orange	Orange	Yellow
	Invaders	Orange	Orange	Dark Red	Dark Red	Yellow
Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas	Orange	Orange	Dark Red	Dark Red	Orange
	Erosion and Deposition	Orange	Orange	Orange	Orange	Orange
Changes in Resource Use	Shift in Target Species	Orange	Orange	Orange	Orange	Orange
	Species Introduction	Orange	Orange	Orange	Yellow	Light Green

WASHINGTON COUNTY, MAINE

Washington County GPAC Watershed Forum

Location: University of Maine Machias, Machias, ME

Date: January 17, 2003

Convener:

Steve Koenig, Director

Peter Steenstra, Chair

Salmon Habitat and River Enhancement

Project (SHARE) Education Committee

PO Box 466, Cherryfield, ME 04622

207-546-3330

- *Number of Attendees:* Approximately 50 representing SHARE members, local, state and national governments; non-government organizations such as the Watershed Councils for Dennys River, East Machias River, Machias River, Pleasant River and Narraguagus River, Cobscook Bay Resource Center, fishermen, University of Maine Machias professors, Passamaquoddy Tribe at Pleasant Point, land trusts, scientists and businesses. 300 were mailed invitations.
- *Media coverage – public education:* Local and regional print coverage before and at the event by Downeast Coastal Press, Quoddy Tides, Machias Valley News Observer. Soni Biehl, the coordinator for the Forum also mailed out the GPAC questions to many citizens and local schools.
- *Was there good exchange of information from the general public to scientists and scientists to public?* Yes, there was a very good exchange. There were displays from 23 organizations at the Forum.
- *As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?* Yes, SHARE's work in previous years has led to significant public understanding of the importance of "watersheds." There is understanding about the larger Gulf of Maine watershed.
- *As a result of forum, do more public and land-based managers understand concept of the "water cycle" than before?* Yes.
- *How was the matrix completed?* Individuals filled out at forum. Citizens who had been mailed the questions and students filled out the matrix individually. At the Forum, attendees highlighted three issues to be brought to the Summit.
- *Any follow-on activities?* The Passamaquoddy Tribe has requested that the GPAC forum coordinator (Soni Biehl) write a curriculum for the 50 Ways to Save the Gulf of Maine. The watershed councils meet each month and work continues.

Priority Issues Identified for Washington County, ME

- Directors of the five endangered salmon rivers watershed councils spoke about their important riparian and stream protection activities such as:
 1. 1000 foot corridor easements: 58 mile and 30,000 acre easements on the Machias River by International Paper, Atlantic Salmon Federation and State of Maine in 2 phases.
 2. Correct culvert placement (removing "hanging culverts) so that water flow can be maintained. Re-planting raw banks and eroded areas.
 3. Water quality: learning about: seasonal variations (more acidic in the Fall), overboard discharge, toxics from landfills (including Superfund landfill (PCB), forestry harvesting, road building and maintaining, irrigation and pesticide spraying for blueberry fields.
 4. Low ph affects gill formation. Salmonids cannot survive if <5.0 ph. The Machias River is 4.2ph.
- Representatives from the Passamaquoddy Tribe at Pleasant Point and Cobscook Bay Resource Center spoke about their study "Identifying Pollutants in Species Regularly Consumed by Native Americans in Passamaquoddy Bay Region." They talked about red tide and green slime algal blooms and how they have identified and corrected threats that allowed 2000 acres of clam flats in area to open.
- UME Machias Professor Kraus spoke about need for regional centers for data documentation and sharing information and trained volunteers for water quality monitoring.
- Maine Dept of Environmental Protection spoke about threats to Downeast Rivers: persistent toxics, air pollution and loss of habitat and biodiversity.

MAJOR CONCLUSIONS

Top issues affecting the health of Washington County's watersheds

1. Acid/toxic deposition
2. Desire for sustainable commercial fishing: depletion of numbers of fish; habitat changes; loss of native species; invasive species.
3. Lack of community capacity to gather information needed to make informed decisions.
4. Positive notes: Integrated pest management being practiced more often; riparian zones being developed; and creation of land trusts.

Washington County, Maine, Matrix

Indicator		Washington Co., ME	Salt Water	Dennys R. Watershed	Machias & E. Machias R. Watershed	Narraguagus R. Watershed	Pleasant R. Watershed
Water Quality	Bacteria	Orange	Orange	Orange	Orange	Orange	Orange
	Nutrients	Orange	Orange	Orange	Orange	Orange	Orange
	Sediments	Orange	Orange	Yellow	Yellow	Orange	Orange
	Toxic Contaminants	Orange	Red	Red	Orange	Orange	Red
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Orange	Red	Yellow	Yellow	Orange	Orange
	Wetlands	Orange	Orange	Orange	Orange	Orange	Orange
	Seagrass	Yellow	Orange	Yellow	Yellow	Light Blue	Yellow
	Nesting & Foraging Areas	Yellow	Red	Orange	Yellow	Yellow	Yellow
	Spawning & Nursery Areas	Orange	Orange	Orange	Red	Orange	Orange
Changes in Species	Populations	Red	Red	Red	Orange	Orange	Orange
	Diversity	Orange	Red	Orange	Yellow	Orange	Yellow
	Dominance	Red	Red	Orange	Yellow	Orange	Yellow
	Invaders	Red	Red	Red	Red	Orange	Orange
Changes in Use and Integrity of Water and Riparian Zones	Clearing and Development of Natural Areas	Yellow	Orange	Orange	Yellow	Orange	Orange
	Erosion and Deposition	Yellow	Orange	Orange	Orange	Orange	Orange
Changes in Resource Use	Shift in Target Species	Orange	Red	Orange	Yellow	Orange	Orange
	Species Introduction	Red	Red	Orange	Red	Red	Red

BUZZARDS BAY, MASSACHUSETTS

State of the Bay 2003

This conference was not a GPAC regional watershed forum. The area covered is not within the Gulf of Maine, however, some issues being addressed are similar to those being assessed in the Gulf of Maine.

Location: New Bedford, Massachusetts

Date: November 22, 2003

Convener:

Coalition for Buzzards Bay
Mark Rasmussen, Executive Director
620 Belleville Avenue
New Bedford, MA 02745
(508) 999-6363 x 201, www.savebuzzardsbay.org

- *Number of Attendees:* 80 including town conservation commissions & Boards of Health, Coalition for Buzzards Bay members, agencies, as well as members of the general public. Invitations were mailed to all members of the Coalition—3,000.
- *The State of the Bay 2003* report was issued at the Conference. The report was mailed to all members and supporters – about 4,000. The report was also delivered to all town halls and libraries in the region. It is available on line at www.savebuzzardsbay.org.
- *There were many presentations at the Conference given by the following speakers:*
Mark Rasmussen, CBB Executive Director
Nitrogen Pollution—Brian Howes, Ph.D., UMass School for Marine Science & Tech.
Bacterial Contamination—David Janik, MA Office of Coastal Zone Management
Oil Pollution—Christopher Reddy, Ph.D., Woods Hole Oceanographic Institution
PCB Update in New Bedford Harbor—David Dickerson, U.S. EPA
Falmouth Friendly Lawn Campaign—Hila Lyman, Falmouth
Eelgrass—Joseph Costa, Ph.D., Buzzards Bay Project National Estuary Program
Bay Scallops—Dale Leavitt, Roger Williams University
Herring—David Watling (invited), Alewives Anonymous, Rochester
Regional Growth Trends—Steve Smith, SE Regional Planning & Economic Dev. District
Value of Streams—Paul Sturm, Center for Watershed Protection
Community Preservation Act—Mary McFadden, Wareham
John Bullard, CBB President
- *Media coverage:* The event and report findings received press in the New Bedford Standard-Times, Upper Cape Codder, Cape Cod Times,

- Falmouth Enterprise, Sarasota Herald-Tribune, Associated Press, The Fairhaven Advocate, Providence Journal and the Berkshire Eagle.
- *Was there good exchange of information from the general public to scientists and scientists to public?* Yes and a good exchange of questions by the general public to the scientists. There were no breakouts or small group discussions.
 - *As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?* Not applicable as Buzzards Bay outside Gulf of Maine.
 - *As a result of forum, do more public and land-based managers understand concept of the “water cycle” than before?* Most attendees went away with a tremendous amount of knowledge and understanding from the new assessment information on the various sectors listed in the State of the Bay Report.
 - *How was the matrix completed?* No matrix was produced, but an extensive State of the Bay report was produced which can be found on the Coalition’s website noted above.

KEY FINDINGS IN THE STATE OF BUZZARDS BAY (MA) 2003 REPORT

The Coalition for Buzzards Bay used a scale of 0-100. 100 represents the pristine Buzzards Bay described by explorer Bartholomew Gosnold in 1602.

1. Buzzards Bay scored 48 (out of 100)
2. Steadily increasing load of nitrogen pollution that flows to the Bay from wastewater treatment plants, septic systems, lawn and agricultural fertilizers and acid rain.
3. Today, more than 1/2 of the bay’s harbors and coves are degraded due to nitrogen.
4. Shellfish beds closed due to bacterial contamination in Buzzards Bay have decreased by 43% in the past 12 years.
5. The health of river herring in the Bay scored a disappointing 5 out of 100 due to the drastic decline in population numbers.
6. The area of the report that scored the highest was forests, with a score of 76.
7. Toxic pollution scored 45 out of 100. The score was low due to the oil spill that occurred in 2003.

MOUNT HOPE BAY, RHODE ISLAND/MASSACHUSETTS

The Mt. Hope Bay Symposium (NEERS/SNECAFS Joint Spring Meeting)

This conference was not a GPAC regional watershed forum. The area covered is not within the Gulf of Maine, however, some issues being addressed are similar to those being assessed in the Gulf of Maine.

Location: Fairhaven, Massachusetts

Date: May 10, 2003

Convener:

The School for Marine Science and Technology
University of Massachusetts Dartmouth
706 S. Rodney French Boulevard
New Bedford, MA 02744

- *Number of Attendees:* 168
- *Media coverage:* Estuarine Research Federation Newsletter vol. 29, No. 1
- *Was there good exchange of information from the general public to scientists and scientists to public?* Scientists from regional academic and professional institutions presented 16 full papers and 6 posters of their research within Mt. Hope Bay. Representatives from regional management agencies (EPA, MAD-MF, NMFS, etc.), and conservation groups (Save the Bay) attended this meeting. Representatives from the Brayton Point Power Station and local municipalities were also present. The symposium resulted in an excellent exchange of ideas and information among all constituents. Several controversial issues were discussed, including the possible effects of the Brayton Point Power Station on winter flounder and other fishes, and on the Mt. Hope Bay heat budget.
- *As a result of forum, do more public and land-based managers understand concept of the Mt. Hope Bay Watershed than before?* This was an excellent source of information for local resource managers and municipal leaders on the state of Mt. Hope Bay. The spirited exchange between the scientists, resource managers and resource users enhanced our understanding of the bay and the issues surrounding it. Several parties on opposite sides of controversial issues commented on how useful it was to get everyone in the same room to discuss the issues. Although the opinions of scientists and managers relative to the various controversies were not changed, the exchange of information helped improve the atmosphere of cooperation and helped all parties to focus on the relevant issues in a constructive manner.
- *Any follow-on activities?* About half of the papers presented during the symposium will be published

as full peer-reviewed papers in a special issue of The Northeast Naturalist devoted to Mt. Hope Bay, which is due out in Fall 2004.

There were three issues highlighted at the Symposium:

1. Whether the Brayton Point Power Plant thermal effluent has a significant impact on the annual heat budget for the system. Scientists from various institutions presented observational and model simulation studies that either suggests a strong impact, or negligible impacts. Additional research is needed.
2. Whether the Brayton Point Power Plant operations directly or indirectly caused the collapse of Mt. Hope Bay populations of winter flounder and other species. Presentations arguing a direct cause-and-effect relationship between the Brayton Point Power Plant operations and winter flounder population collapse contrasted with studies that suggest the collapse in Mt. Hope Bay resulted from the same factors that caused the concurrent collapse of winter flounder throughout the Narragansett Bay system.
3. Another major issue arising from the symposium was the presentation of water quality data that suggests that Mt Hope Bay may be exhibiting signs of eutrophication. Studies focused on water quality and nutrient loading in Mt. Hope Bay are needed.

MAJOR CONCLUSIONS

- Mt Hope Bay is a complex ecosystem that has been affected by over 200 years of human activity.
- It is clear that its current state of health cannot be attributed to the influence of the Brayton Point Power Plant alone.
- The symposium demonstrated the need for academic institutions, resource managers, conservation groups, and resource users to work together to study Mt. Hope Bay from an ecosystem perspective to resolve the controversial issues surrounding the Bay and to develop management plans for the system.
- Mt. Hope Bay's ecosystem cannot be studied in isolation from the greater Narragansett Bay. Significant exchange of water between Mt. Hope Bay and Narragansett Bay strongly influence local water quality. The degree of isolation of fish populations between Mt. Hope Bay and Narragansett Bay must be determined before assessment of Mt. Hope Bay fish stocks can be made.

Summary of Canadian Watershed Participation in Gulf of Maine “State of the Gulf” Reporting

Ten locations in the Canadian Gulf of Maine were represented in the initial “From the Bottom Up” process of “State of the Gulf” reporting. The inaugural forum was organized by the Bay of Fundy Ecosystem Partnership (BOFEP) as part of its April 2002 Bay of Fundy Workshop. The area considered at this workshop was coastal Bay of Fundy outside estuarine influence. It was at this workshop that the EPA matrix format of reporting was proposed and a preliminary attempt at identifying indicators and filling in the matrix was attempted. Following the workshop, the matrix was refined and then adopted for all the watershed forums to use. Due to technical difficulties, we do not yet have a report from the inaugural forum.

Five reports were received from New Brunswick watersheds, each generated under different conditions. Two held forums specifically to complete the matrix—the upper (hosted by Falls Brook Centre) and lower (hosted by ACAP-Saint John) St. John River watersheds. The St. Croix Estuary Project (SCEP) completed the matrix based on in-house expertise and information, although public meetings and training sessions were held that complemented the process. After being unsuccessful in identifying a watershed-based organization to take the lead in the Quoddy region, the matrix for the area between Saint John and St. Croix was prepared in-house by the Conservation Council of New Brunswick based on a comprehensive study, “Two Hundred Years of Ecosystem and Food Web Changes in the Quoddy Region, outer Bay of Fundy.” Finally, the Inner Bay of Fundy (Chignecto-Shepody-Cumberland) report was prepared by the Petitcodiac Riverkeeper Inc., based on the results of a workshop organized by the Fort Folly First Nation for the Inner Bay of Fundy Working Group.

Reports were prepared for four Nova Scotia watersheds. Forums were held in St. Mary’s Bay, Minas Basin, and Yarmouth-Lobster Bay. The report submitted for the Annapolis watershed reflects a separate, ongoing planning process spearheaded by the Clean Annapolis River Project and a matrix was not prepared for this area. The Yarmouth-Lobster Bay forum was not hosted by

a local organization. The Minas Basin and St. Mary’s Bay forums were hosted by existing “working groups” formed around those waterbodies. None of the forums in New Brunswick or Nova Scotia were advertised as public events; instead, invitations were issued to groups, agencies, institutions or experts according to their involvement or interest in the watershed. Because GPAC did not provide a common standard for each indicator in the ‘state of the watershed’ matrix, the allocation of a colour to each indicator represents the best judgment of event participants or in-house experts, even where data on that indicator exists. In most cases, the colours were allocated to a sub-region based on a comparison with another sub-region within the same watershed. While for some indicators this approach may translate into absolute measures relative to the entire Gulf of Maine (e.g. marine mammal habitat), it is unlikely that a “red” designation for water quality in the Quoddy Region or St. Mary’s Bay is comparable in actual contaminant levels to a “red” designation for Boston or St. John Harbour. Similarly, development of coastal areas in the Quoddy Region is qualitatively and quantitatively different than in the southern Gulf of Maine, but within the Quoddy Region can be rated a high, moderate and low impact. This makes it difficult, if not impossible, to compare one watershed to another using these matrices.

Without exception, all reports were constrained by the lack of monitoring or other data, although some areas are worse than others. Some conveners were reluctant to endorse their own reports because of this. The Inner Bay of Fundy, upper St. John River, St. Mary’s Bay and Yarmouth-Lobster Bay appear to be the least well-documented watersheds. In other areas, data is variable within the watershed. Biodiversity and nutrient data seem to be the least available across the boards. Forums and reports were also constrained by funding. While GPAC’s original goal was to provide as much as \$5,000 to watershed conveners, the reality fell far short. GPAC was not able to secure an umbrella grant that could be allocated across the entire Gulf of Maine. In New Brunswick, a grant from the New Brunswick Environmental Trust Fund solicited by the Conserva-







Canada: Overview

tion Council of New Brunswick provided a maximum of \$2,000 and a minimum of \$500 to conveners. In Nova Scotia, conveners were generally left to cobble together resources for their own efforts, some more successfully than others. In the end, most of the costs were covered or absorbed by the convening/reporting organizations. Where there were no organizations with a compatible mandate to run the process, a great deal of volunteer effort was involved in the convening of and reporting on forums.

This raises the final issue of capacity inherent within Canadian watersheds to participate in ongoing “state of the watershed” environmental reporting that could conform to any future Gulf of Maine-wide norms. The Conservation Council remains active in the Quoddy Region and can continue to participate in watershed-based reporting. Those watersheds that are ACAP sites also have the organizational infrastructure to do this. Even in these groups, however, continuity and capacity is an issue. For example, the convener of the Lower St. John River-Harbour forum has since left ACAP-Saint John, taking with him the organizational memory of the process and its results. In the case of the Annapolis River watershed, the ACAP group was engaged in a comprehensive planning process which, while relevant, did not fit the specific “state of the watershed” reporting requirement of the Summit process. In the Upper Saint John River and Yarmouth-Lobster Bay, forums were convened by individuals with little or no organizational back up. The project that supported the Inner Bay of Fundy forum convened by the Fort Folly First Nation has since ended and the convener has moved on, as has the lead person at Petitcodiac Riverkeeper who worked with the forum convener and produced the report. The Minas Basin Working Group, as a sub-committee of the Bay of Fundy Ecosystem Project (BOFEP) has some legs because of the volunteer involvement of agencies and universities associated with BOFEP. Staff resources for the Working Group are provided on a project basis by government departments. However, this is not a standing organization. The St. Mary’s Bay Working Group as a volunteer-based group with members drawn from resource-harvesting associations and First Nations, facilitated by the Marine Resource Centre in Cornwallis, is in a similar situation.

Because of the wide range of capacity, both in information availability and in organizations, the results of this initial iteration of ‘state of the watershed’ reporting are

MATRIX COLORS AND SYMBOLS

-  (Red): Definite problem
-  (Orange): Definite to moderate problem
-  (Yellow): Moderate problem
-  (Light green): Moderate to no problem
-  (Green): No problem
-  (White): No answer in that category

DK: Not enough data

NA: No answer/not applicable

?: Unsure

Black type inside a matrix box: subregion or issue that is noteworthy

Special Note 1: The matrix colors chosen by these forums, groups and individuals are based on a combination of data, local knowledge and observation, family history, and best personal and/or professional judgment.

Special Note 2: Many of these forums used only three colors to indicate the severity of a problem—red, yellow, and green—rather than all five colors used in the US GPAC matrices. In some cases, panes for specific areas were split to show two colors. This signifies a trend. For instance:

Green to Yellow: not a problem yet but expected to become one in the future

Yellow to Red: currently a moderate problem but expected to become more severe

widely variable, as is the capacity to continue such reporting in the future. These issues must be part of the discussion as decisions are made and plans developed for an ongoing “State of the Gulf” reporting process.

*Janice Harvey and Leslie Bruce
Conservation Council of New Brunswick
March 31, 2004*

LOWER SAINT JOHN RIVER WATERSHED, NEW BRUNSWICK

Lower Saint John River/Kennebecasis River Environmental Forum

Location: Saint John, NB

Date: February 12, 2003

Convener:

Sean Brilliant, ACAP Saint John
PO Box 6878, Station "A"
Saint John, NB E2L 4S3
Telephone: (506) 652-2227
Email: acapsj@fundy.net

- **Background:** There were 34 participants, including members of local watershed groups, government managers and scientists, municipal engineers, and environmental groups, as well as some knowledgeable citizens and university researchers. Participants completed the matrix during the meeting. Consensus was reached, more or less, on the designation for each box in the matrix.
- **Media coverage:** The forum was not publicly advertised but there was media follow up.
- **Was there good exchange of information from the general public to scientists and scientists to public?** There was a good exchange of information among participants. Only a few were scientists but all were knowledgeable about one or more sub-regions of the watershed. The 'general' public was not present.
- **As a result of the forum, do more public and land-based managers understand the concept of the Gulf of Maine watershed than before?** There was no discussion of the Gulf of Maine watershed. Participants were convened because of their knowledge of and involvement in an area of the watershed in order to develop the matrix.
- **As a result of the forum, do more public and land-based managers understand the concept of the "watershed" than before?** The individuals went away with a better sense of how they fit into the puzzle of the watershed. It was the first opportunity to convene those involved in fresh water tributaries with those involved in the estuary and marine areas of the watershed, and everyone learned from everyone else.

- **Any follow-on activities?** No follow-on activities were committed to at this forum, although the information generated and contacts made will likely serve each participant well in their own work.

PRIORITY ISSUES

[divided into the subregions of Saint John Harbour, Kennebecasis Bay, Upper Kennebecasis River, Saint John River, Musquash (Harbour & River), Loch Lomond, Nerepis River]

Water Quality

- The Saint John Harbour has severe problems, as do Kennebecasis and Nerepis Rivers. Loch Lomond and Musquash showed good indicators.

Presence of Critical Habitats/Natural Areas

- Musquash and Loch Lomond are in good condition according to all indicators. Kennebecasis River and Nerepis River have severe problems.

Changes in Species

- There is missing information for diversity, dominance, and invaders for most areas. All regions showed strong declines in species populations.

Use and Integrity of Riparian Zones

- Upper Kennebecasis River, the marine coastline outside the harbour and Musquash are in good condition. Areas of concern include Kennebecasis Bay and Nerepis River.

Changes in Resource Use

- Except for Loch Lomond, all areas showed strong shifts in targeted species. Information on species introductions and shifting from resource use to tourism is unavailable.

MAJOR CONCLUSIONS

- Kennebecasis Bay, Saint John Harbour and Nerepis River emerged as priority areas of concern, both in terms of contaminants and habitats.
- More information needs to be gathered in terms of changes in species and resource use.

Lower Saint John River Watershed Matrix

Indicator		Saint John Harbour	Lower Kenn. R. (Bay)	Upper Kenn. R.	Saint John River	Musquash Harbour & River	Loch Lomond	Nerepis River	Coastal Bay of Fundy
Water Quality	Bacteria	Red	Red	Yellow	Yellow	Yellow	Green	Yellow	Yellow
	Nutrients	Red	Red	Red	Yellow	Yellow	Green	Yellow	Green
	Sediments	Red	Red	Red	Red	Yellow	Green	Red	Yellow
	Toxic Chemicals	Red	Yellow	Green	Yellow	Green	Green	Yellow	Green
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow	Yellow	Yellow	Yellow	Green	Green	Red	Yellow
	Wetlands	Yellow	Red	Green	Yellow	Green	Green	Green	?
	Aquatic Vegetation	Yellow	Red	Yellow	Yellow	Green	Green	Red	Green
	Nesting & Foraging Areas	Yellow	Red	Red	Yellow	Green	Green	Red	Green
	Spawning & Nursery Areas	Yellow	Red	Yellow	Yellow	Green	Green	Red	Yellow
	Protected Areas	Yellow	Yellow	Red	Green	Green	Green	Red	Red
Changes in Species	Populations	Red	Red	Red	Red	Red	Red	Red	Red
	Diversity	?	?	?	?	?	?	?	?
	Dominance	?	?	?	?	?	?	?	Red
	Invaders	Green	?	Green	?	?	?	?	?
Use and Integrity of Riparian Zones	Clearing and Development of Natural Areas	Red	Red	Green	Yellow	Green	Green	Red	Green
	Replacement of Traditional Uses	Green	Red	Green	Yellow	Green	Green	Yellow	Green
	Erosion and Deposition	Yellow	Red	Green	Green	Green	Green	Red	Green
	Changes in Water Flow	Green	Green	Green	Green	Red	Red	Yellow	Green
Changes in Resource Use	Shift in Targeted Species	Red	Red	Red	Red	Red	Green	Red	Red
	Species Introductions	?	?	?	?	?	?	?	?
	Shift from Resource Use to Tourism	?	?	?	?	?	?	?	?

UPPER SAINT JOHN RIVER WATERSHED, NEW BRUNSWICK

GPAC Community Forum

Location: Knowlesville, New Brunswick

Date: November 22, 2003

Convener:

George Peabody
Meduxnekeag River Association
733 Main St, Unit 1
Woodstock, NB E7M 2E6
Telephone: (506) 325-1100

- *Number of Attendees:* 10 participants including those from Western Valley Tourism Association, Saint John River Society, Canadian Rivers Institute, Société d'aménagement de la rivière de Madawaska et du lac Témiscouata Inc., as well as local town representatives.
- *Media coverage:* There was no media coverage. Invitations were sent out to the full range of interests including municipalities, primary producers, businesses, environmentalists, watershed groups, etc.
- *Was there good exchange of information from the general public to scientists and scientists to public?* Not really. There was not enough scientific data and it was difficult to obtain the data that has been collected.
- *As a result of the forum, do more public and land-based managers understand the concept of the Gulf of Maine watershed than before?* Yes
- *As a result of the forum, do more public and land-based managers understand the concept of the "watershed" than before?* Yes, many knew this already.
- *Any follow-on activities?* Not specifically.

PRIORITY ISSUES

[the area was divided up into Mactaquac/ Woodstock, Woodstock/ Beechwood, Beechwood/Tobique, Madawaska/Edmundston]

Water Quality

- All indicators—bacteria, nutrients, sediments, toxic contaminants, and BOD—showed an overall moderate to severe problem.

Presence of Critical Habitats/Natural Areas

- Much is unknown about wetlands. Nesting and foraging areas, the presence of protected areas and benthic habitat were noted as having moderate to

severe problems. There were moderate problems in the spawning and nursery areas.

Changes in Species

- Endangered species and invaders are a moderate problem across the board. Changes in species populations are slightly more severe problems in all areas.

Use and Integrity of Riparian Zones

- There is a severe problem in terms of replacement of traditional uses and erosion and deposition changes in all areas. The clearing and development of natural areas is a concern as well.

Changes in Resource Use

- In all areas, shift in target species and an increase gravel pits were a moderate to severe problem. Land-fill sites were noted as a moderate problem. Shift from resource extraction to tourism/recreation use, species introductions, and motorized recreational vehicles, in that order, were low to moderate problems.

MAJOR CONCLUSIONS

- There were limitations to what was accomplished due to the number of people who were able to attend the workshop.
- There is a severe problem in all indicators of the changes in use and integrity of riparian and water zones.
- Overall, there was little difference between each subregion of the watershed in terms of the various problems.
- Not one area stood out as worse than any others.

Upper Saint John River Watershed Matrix

Indicator		Maқтаquac to Woodstock	Woodstock to Beechwood	Beechwood to Tobique	Madawaska to Edmundston	Overall				
Water Quality	Bacteria	Yellow	Red	Yellow	Green	Yellow	Red	Yellow	Red	
	Nutrients	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	
	Sediments	Yellow	Red	Yellow	Red	Green	Yellow	Yellow	Red	
	Toxic Contaminants	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	
	Biological Oxygen Demand	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow	Red	Yellow	Red	Green	Red	Yellow	Red	Yellow
	Wetlands	?	?	?	?	?	?	?	?	Yellow
	Nesting & Foraging Areas	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
	Spawning & Nursery Areas	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Protected Areas	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
Changes in Species	Populations	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
	Invaders	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Endangered Species	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas	Red	Yellow	Red	Green	Yellow	Green	Yellow	Yellow	Red
	Replacement of Traditional Uses	Red	Red	Red	Red	Red	Red	Red	Red	Red
	Erosion and Deposition Changes	Red	Red	Red	Red	Red	Red	Red	Red	Red
Changes in Resource Use	Shift in Targeted Species	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
	Species Introductions	Green	Yellow	Green	Yellow	Green	Yellow	Green	Yellow	Green
	Shift from Resource Extraction to Tourism/Recreational Use	Green	Yellow	Green	Yellow	Green	Yellow	Green	Yellow	Green
	Motorized Recreational Vehicles	Green	Yellow	Green	Yellow	Green	Yellow	Green	Yellow	Green
	Gravel Pits	Yellow	Red	Yellow	Red	Yellow	Red	Yellow	Red	Yellow
	Landfill Sites	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

St. Croix Estuary, New Brunswick*

*No specific forum was held for this summary and matrix.

Convener:

Art McKay
St. Croix Estuary Project, Inc.
178 Milltown Blvd
St. Stephen, NB E3L 1G8
Telephone: (506) 467-9905
Email: artmckay@scep.org

- **Background:** There was not a specific forum to fill out the matrix. However, an annual PEST (Program for Estuary Stewardship Training) program was conducted with over 10 public meets. Results were drawn from these meetings and a two-year Health of the Estuary study that has more in depth information than what was requested for the Gulf of Maine work.

PRIORITY ISSUES

[divided into main stem and tributaries of the upper estuary; Oak Bay, Waweig, and main stem in the lower estuary and St. Andrew's and the main bay portion of the Passamaquoddy Bay]

Water Quality

- Data for toxics and sediments are currently being analyzed. Dissolved oxygen is not much of a problem except in Oak Bay where high domestic inputs into a causeway pond are causing a complex of problems resulting in loss of fish and invertebrate habitat together with loss of bird forage species. Bacteria and nutrients are a severe problem in the

main stem of the upper estuary, Oak Bay, Waweig, and St. Andrew's. On the average over a ton of toxic chemicals is being emitted into the air each day with serious potential lethal and sublethal impacts on humans and aquatic organisms.

Presence of Critical Habitats/Natural Areas

- Benthic habitat and nesting and foraging area is diminished in the Estuary. Degradation of bottom habitat in the lower estuary continues.

Changes in Species

- Green crab populations are high. Serious drops in biodiversity and abundance have occurred over the last 25 years. Anadromous fish runs are at an all-time low.

Use and Integrity of Riparian Zones

- Clearing and development are severe problems in all areas. Replacement of traditional uses and erosion/deposition is a moderate to severe problem.

Changes in Resource Use

- There is a severe to moderate problem in the shift in target species as well as resource to industrial/domestic. Losses are estimated to be in the 10 to 20 million dollar range. There is little problem with species introductions.

MAJOR CONCLUSIONS

- There is much remedial work that must be done.
- A work plan will be devised in 2004.

St. Croix Estuary Matrix

Indicator		Upper Estuary		Lower Estuary			Passamaquoddy Bay	
		Mainstem	Tribs	Oak Bay	Waweig	Mainstem	St. Andrews	Main Bay
Water Quality	Bacteria	Red	Yellow	Red	Orange	Yellow	Orange	Light Green
	Nutrients	Red	Yellow	Red	Orange	Yellow	Orange	Light Green
	Dissolved Oxygen	Green	Light Green	Yellow	Light Green	Green	Green	Green
	Toxic Contaminants	?	?	?	?	?	?	?
	Sediments	?	?	?	?	?	?	?

Presence of Critical Habitats or Natural Areas	Benthic Habitat	Green	Green	Green	Green	Green	Green	Green
	Wetlands	Yellow	Yellow	Yellow	Yellow	Green	Green	Green
	Seagrass Beds	Yellow	Yellow	Yellow	Yellow	Light Green	Light Green	Light Green
	Nesting & Foraging Areas	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
	Spawning & Nursery Areas	Yellow	Yellow	Yellow	Light Green	Light Green	Light Green	Light Green
	Marine Protected Areas	Yellow	Yellow	Yellow	Yellow	Green	Green	Green

Changes in Species	Populations	Red	Red	Red	Orange	Orange	Orange	Orange
	Diversity	Red	Red	Red	Orange	Orange	Orange	Orange
	Dominance	Orange	Orange	Orange	Orange	Orange	Orange	Orange
	Invaders	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green

Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas	Red	Red	Red	Red	Red	Red	?
	Replacement of Traditional Uses	Orange	Orange	Orange	Orange	Orange	Orange	Orange
	Erosion and Deposition Changes	Orange	Orange	Orange	Orange	Orange	Orange	?

Changes in Resource Use	Shift in Target Species	Orange	Orange	Orange	Orange	Orange	Orange	Orange
	Species Introductions	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green	Light Green
	Resource to Industrial/Domestic	Orange	Orange	Orange	Orange	Orange	Orange	Orange

THE QUODDY REGION*

Two Hundred Years of Ecosystem and Food Web Changes in the Quoddy Region, Outer Bay of Fundy

* Maces Bay to Passamaquoddy Bay including the Fundy Isles

Date: April 2003

- **Background:** Because a forum convener for this large region of the Bay of Fundy coastline was not found, and since all the indicators in the matrix were examined in a major study published by the Conservation Council in 2002, CCNB staff translated the results into the matrix format for this area. This report had been vetted in October 2002 at a Quoddy Region Round Table organized by CCNB. There were 25 participants from academia, conservation groups, federal, provincial and municipal governments, Passamaquoddy First Nation, fishing industry and aquaculture industry.

PRIORITY ISSUES

[divided into the subregions of Passamaquoddy Bay, L'Etang, West Isles, Maces Bay, Grand Manan, and Open Water / The Wolves (inc Machias Seal Island)]

Water Quality

- Passamaquoddy Bay and L'Etang subregions have severe problems according to all indicators whereas West Isles and Grand Manan had moderate problems. There was generally good water quality in Open Water / The Wolves.

Presence of Critical Habitats/Natural Areas

- Wetlands are moderately impaired in all areas. The areas of concern were rockweed beds in L'Etang and West Isles, spawning and nursery areas in Passamaquoddy Bay and L'Etang and marine mammals habitat in L'Etang. Also concern for loss of undisturbed (light, noise, cleared land) coastline including water. Concern also for the establishment of fish farms near offshore islands heavily used by seabirds for nesting.

Changes in Species

- There has been a shift in dominant species in most trophic levels throughout the area. The L'Etang estuary is suffering according to all indicators. Passamaquoddy Bay has severe declines in species populations and diversity. Invaders have not become an issue.

Use and Integrity of Riparian Zones

- Clearing and development of natural areas is a serious concern for all areas. L'Etang has severe problems in all indicators. Fishing grounds have been lost to marine aquaculture (intense in this region), as have shorelines and beaches. Fish farms adjacent to undeveloped islands are creating noise and traffic, affecting birds and marine mammals.

Changes in Resource Use

- The shift in target species is a severe problem as fishing effort targets species lower and lower on the food web. Aquaculture has supplanted many herring weirs and herring shut-off operations. Commercial fisheries for wild salmon have been closed since the early 1980s.

MAJOR CONCLUSIONS

- L'Etang estuary and to a lesser degree Passamaquoddy Bay are of particular concern.
- Significant shifts in species dominance within trophic levels and dramatic fish population declines have occurred.
- The combination of habitat loss, especially 3-dimensional subtidal habitat, contaminant loading (nutrients, toxics) and overfishing have undermined the ecology of the inner Quoddy region.

The Quoddy Region Matrix

Indicator		Quoddy Region	Passam. Bay	L'Etang Estuary	West Isles	Maces Bay	Grand Manan	Open Water
Water Quality	Bacteria	Yellow	Red	Red	Yellow	Yellow	Yellow	Green
	Nutrients	Yellow	Red	Red	Yellow	Green	Yellow	Green
	Sediments	Yellow	Red	Red	Yellow	Green	Yellow	Green
	Toxic Contaminants	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow
	Dissolved Oxygen	Yellow	Red	Red	Yellow	Green	Yellow	Green
Presence of Critical Habitats or Natural Areas	Benthic Habitat	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow
	Wetlands	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	N/A
	Seagrass Beds	Yellow	Yellow	Red	Red	Yellow	Yellow	Green
	Nesting & Foraging Areas	Green	Yellow	Yellow	Green	Green	Green	Green
	Spawning & Nursery Areas	Yellow	Red	Red	Yellow	Yellow	Yellow	Green
	Protected Areas	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
	Marine Mammal Habitat	Yellow	Yellow	Red	Yellow	Green	Yellow	Green
Changes in Species	Populations	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow
	Diversity	Yellow	Red	Red	Yellow	Yellow	Yellow	Yellow
	Dominance	Red	Red	Red	Red	Red	Red	Red
	Invaders	Yellow	Yellow	Red	Green	Green	Green	Green
Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas	Red	Red	Red	Red	Red	Red	Green
	Replacement of Traditional Uses	Yellow	Red	Red	Yellow	Green	Yellow	Green
	Erosion and Deposition Changes	Yellow	Red	Red	Yellow	Green	Green	Green
	Tidal Barriers on Streams & Rivers	Yellow	Yellow	Red	Green	Yellow	Green	N/A
Changes in Resource Use	Shift in Targeted Species	Red	Red	Red	Red	Red	Red	Red
	Species Introductions	Green	Green	Green	Green	Green	Green	Green
	Shift from Harvesting to...	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Yellow
	Shift from Harvesting	Yellow	Red	Red	Yellow	Green	Yellow	Green

INNER BAY OF FUNDY
CHIGNETO, SHEPODY, CUMBERLAND WATERSHED, NEW BRUNSWICK

Inner Bay of Fundy Working Group:
Where Are We Now, Where Are We Going?

Location: Fort Folly First Nation, Dorchester, NB

Date: April 2003

Convener:

Tim Nye
Fort Folly First Nations Habitat Recovery Program*
PO Box 971
Dorchester, NB E4K 3V2
Telephone: (506) 379-3400

* The habitat recovery program currently has no funding and Tim Nye has moved on to other things. Report prepared by Lea Olsen, Petitcodiac Riverkeeper Inc.

- *Background:* This event was planned under separate auspices to bring interested people together to discuss the health of the inner Bay. Rather than convene a separate Summit forum, staff from Petitcodiac Riverkeeper worked with the convener to ensure the agenda reflected the primary questions of the Summit forum.
- *Number of Attendees:* 20 participants from the Department of Fisheries and Oceans, departments of natural resources (NB/NS), Bay of Fundy Biosphere Reserve committee, Petitcodiac Riverkeeper, Canadian Wildlife Service, and Fundy Model Forest. Participation was by invitation.
- *Media coverage:* The media was not contacted about the event.
- *Was there good exchange of information from the general public to scientists and scientists to public?* It was definitely a worthwhile process. There was a very good exchange of information between academics and government, but the general public was not involved.
- *As a result of the forum, do more public and land-based managers understand the concept of the watershed and / or the connections to the Gulf of Maine?* Yes.
- *Any follow-on activities?* There were no follow-on activities, perhaps due to lack of funding.

PRIORITY ISSUES

Water Quality

- Shepody Bay has severe problems with toxic contaminants and nutrient-enriched sediments. Although the Cumberland Basin has moderate problems in both of these categories, it is the least affected of the four regions.

Presence of Critical Habitats/Natural Areas

- The loss of coastal wetlands/salt marsh is severe in all subregions except Chignecto, where it is slightly less severe. The loss of nesting and foraging areas was a moderate problem in all areas. Conservation areas are relatively well represented in Chignecto and Cumberland, but less well represented in Shepody Bay.

Changes in Species

- Declines in species populations is a severe problem except in Cumberland. Shepody has severe problems in all indicators: populations, diversity, and invaders.

Use and Integrity of Riparian Zones

- All indicators—obstruction of water flow, erosion and deposition changes, urban development—are strongly evident in Shepody Bay. Obstruction of flow of water is a severe problem in all areas except Chignecto.

Changes in Resource Use

- While there is a severe problem in the status of fisheries in all areas, impact of tourism was not much of a problem at all. Species introduction is a moderate concern, except in Shepody where it is more severe.

MAJOR CONCLUSIONS

- Shepody Bay is an area of particular concern.
- Continued work in this region is difficult due to lack of funding.

Inner Bay of Fundy Matrix

Indicator		Inner Bay of Fundy	Chignecto Subwatershed	Shepody Subwatershed	Cumberland Subwatershed
Water Quality	Toxic Contaminants	Orange	Orange	Red	Yellow
	Nutrients	Yellow	Yellow	Red	Light Green
	Sediments	Yellow	Yellow	Red	Yellow
Presence of Critical Habitats or Natural Areas	Conservation Areas	Yellow	Light Green	Yellow	Light Green
	Nesting & Foraging Areas	Yellow	Yellow	Yellow	Yellow
	Wetlands	Red	Orange	Red	Red
Changes in Species	Populations	Orange	Orange	Red	Yellow
	Diversity	Yellow	Yellow	Red	Light Green
	Invaders	Orange	Yellow ?	Red	White ?
Changes in Use and Integrity of Water and Riparian Zones	Obstruction to Flow of Water	Orange	Yellow	Red	Orange
	Erosion and Deposition Changes	Yellow	Yellow	Red	Yellow
	Urban Development	Yellow	Yellow	Orange	Yellow
Changes in Resource Use	Species Introduction	Yellow	Yellow	Orange	Yellow
	Status of Fisheries	Orange	Orange	Red	Red
	Development of Tourism (impact of)	Dark Green	Dark Green	Dark Green	Dark Green

ANNAPOLIS RIVER WATERSHED, NOVA SCOTIA*

Moving Forward: An Environmental Management Plan for the Annapolis Watershed

*The region includes the Annapolis Basin, the estuary and the uplands and stretches from Digby to Berwick, NS

Convener:

Clean Annapolis River Project
PO Box 395
Annapolis Royal, NS, CAN, BoS 1A0.
Voice: (902) 532-7533
E-Mail: carp@annapolisriver.ca
Fax: (902) 532-3038
Web: www.annapolisriver.ca and
www.fundybay.com

- **Background:** This report reflects a planning process that took place between May 2002 and February 2003. It was not convened as part of the Gulf of Maine Summit process; therefore, an environmental quality matrix was not prepared and status reports on specific environmental quality indicators are not included. The outcomes were incorporated into a publication, *Moving Forward: An Environmental Management Plan for the Annapolis Watershed*, which has been widely circulated in print and is available on the CARP web site (www.annapolisriver.ca).
- **Number of Attendees:** 100+ representing all orders of government, other NGO's, resource user groups including forestry, agriculture and fishing, economic development agencies, citizens, students and many other sectors. Carried out by a series of open houses, focus group consultations and general input. This was both an extensive and intensive process.
- **Media coverage:** Extensive local media coverage, integrated into ongoing public outreach programs including Internet access.
- **Was there good exchange of information from the general public to scientists and scientists to public?** In the Annapolis watershed there is a 15-year history of engagement of all stakeholders defining issues and proposing solutions. The first comprehensive environment management plan for the region was undertaken in 1995-96. The current process was to update

based on new issues and information. Process will likely be repeated in another five years.

- **As a result of forum, do more public and land-based managers understand concept of the Gulf of Maine watershed than before?** Yes. As well, there is a 15-year history of community engagement in defining issues, setting priorities and implementing solutions. Thus there is fairly wide understanding among most sectors that human activities are compromising future options.
- **Any follow-on activities?** The document *Moving Forward: An Environmental Management Plan for the Annapolis Watershed* formed the basis for a strategic planning process for CARP in which priorities, actions and implementation plans were developed. Outcomes are integrated in all public outreach activities. Typically, these total 75 to 100 events yearly. Several of the identified actions are being implemented, including habitat restoration, riparian reforestation and related activities. New monitoring programs for marine, estuarine and freshwater habitats have been implemented. Issues related to climate change are being integrated. New scientific research aimed at developing targeted response efforts have been initiated.

PRIORITY ISSUES IDENTIFIED FOR THE ANNAPOLIS WATERSHED:

For each of the goals, *Moving Forward: An Environmental Management Plan for the Annapolis Watershed* specifies methods of achieving the goal, what is known, the knowledge gaps and actions required. To preserve the holistic approach, each issue is represented in a matrix that cross-references each issue among the others.

Water Quality Goals:

- Improvement and maintenance of water quality in the watershed so that fecal coliform densities do not exceed a geometric mean of 50 per 100 ml, a median of 50 per 100 ml and that no more than 15% of the samples

Canada: Annapolis Watershed, Nova Scotia

exceed 200 colonies per 100 ml at sites sampled by the various water quality monitoring programs operated by CARP.

Water Quantity Goals:

- Adequate water supply maintained for all users.
- Adequate water supply ensured for all future users.
- Water conservation methods practiced by all users in the watershed.
- Please note that the Geological Survey of Canada in partnership with many others, including CARP, has just initiated a three-year study on the quantity and quality of surface and groundwater in the
- Annapolis/Cornwallis Valleys. This does not presently exist.

Air Quality Goals:

- Maintain and improve air quality throughout the region.
- Increase community awareness of air quality issues in the Annapolis Valley.

Climate Change Goals:

- Understand the effects that climate change will have on the region.
- Enhance community awareness of the probable local trends, hazards and opportunities due to climate change, as well as actions that can be taken to mitigate and adapt.

Habitat Restoration Goals:

- Native habitats maintained or established in order to preserve species diversity and encourage healthy populations of native species.
- Habitat preservation for native species by discouraging the introduction of exotic species.

Legislative Enforcement Goals:

- Current environmental legislation adhered to within the region.
- Implementation of new, stricter, enforceable environmental legislation to protect and improve environmental conditions in the region.

Organizational Policy Consideration:

- The process also identifies issues that CARP should consider when reviewing measures to achieve the goals that emerged from the process.

MAJOR CONCLUSIONS

- As knowledge and understanding improve, issues need to be redefined.
- Holistic approaches that consider ecosystem interactions are required.
- Processes that engage all stakeholders are the key to providing enhanced sustainability of ecological, economic and social resources.
- Future threats include climate change, unmanaged growth, basalt mining and erosion of the social, ecological and economic basis of coastal communities.
- Environmental planning needs to be a continuously adaptive process, always a work in progress.
- Programs to address non-point source pollution, especially on-site wastewater management systems need to be developed.
- Governance issues are paramount to solving our global issues.

ST. MARY'S BAY, NOVA SCOTIA

St. Mary's Bay Workshop

Location: Bay of Fundy Marine Resource Center

Date: December 11, 2003

Convener:
Arthur Bull

- *Number of Attendees:* 10 people representing community groups, fisherman's groups, First Nations, government. This constitutes the St. Mary's Bay Working Group.
- *Was there good exchange of information from the general public to scientists and scientists to public?* There weren't a lot of scientists present.
- *As a result of the forum, do more public and land-based managers understand the concept of the Gulf of Maine watershed than before?* There weren't a lot of managers. It was mostly focused on St. Mary's Bay and not so much the Gulf of Maine watershed.
- *As a result of the forum, do more public and land-based managers understand the concept of the "watershed" than before?* Yes.
- *Any follow-on activities?* Another forum was held on February 18, 2004. The St. Mary's Bay working group does on-going work.

PRIORITY ISSUES

Water Quality

- Bacteria, sediments and toxic contaminants showed severe indicators, whereas nutrients were not much of a problem. Oil spills and garbage/debris is a moderate to severe problem.

Presence of Critical Habitats/Natural Areas

- The benthic habitat is in distress and the wetlands have moderate problems. There is no information

on sea grass beds, nesting and nursery areas, and spawning and nursery areas. The coastal and marine protected areas were noted.

Changes in Species

- Invaders were believed to be a severe problem. Declines in populations were a moderate to severe concern. Changes in species dominance were not a problem. There was no information on diversity.

Use and Integrity of Riparian Zones

- Clearing and development of natural areas and replacement of traditional species present severe problems. There was no problem with erosion and deposition changes.

Changes in Resource Use

- There was strong concern for development of non-renewable resources. There are moderate problems in shift in target species. Species introductions and shift from resource extraction to tourism/recreation use were not much of a problem.

MAJOR CONCLUSIONS

- There is a need for an on-going research strategy to answer the questions raised about water quality, monitoring and pollution.
- The work of the St. Mary's Bay Working Group should continue and this group should link into the work of similar groups around the Gulf of Maine.
- St. Mary's Bay is in reasonably good shape. There are no real heavy uses in terms of mining or fishing. It will take a concerted effort to stay that way, as there are potential major threats on the horizon (e.g. proposed quarry).

St. Mary's Bay Matrix

Indicator		St. Mary's Bay
Water Quality	Bacteria	Red
	Nutrients	Green
	Sediments	Red
	Toxic Contaminants	Red
	Other	Red and Yellow

Presence of Critical Habitats or Natural Areas	Benthic Habitat	Red
	Wetlands	Yellow
	Seagrass Beds	?
	Nesting & Foraging Areas	?
	Spawning & Nursery Areas	?
	Marine Protected Areas	?

Changes in Species	Populations	Yellow, Red, Yellow
	Diversity	White
	Dominance	Green
	Invaders	Red

Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas	Red
	Replacement of Traditional Species	Red
	Erosion and Deposition Changes	Green

Changes in Resource Use	Shift in Targeted Species	Yellow
	Species Introductions	Green
	Shift from Resource Extraction to Tourism/ Recreation Uses	Green

YARMOUTH - LOBSTER BAY, NOVA SCOTIA

Yarmouth Forum

Location: Yarmouth, Nova Scotia

Date: November 25, 2003

Convener:

Jacqueline Cook
NS Department of Environment and Labour
Yarmouth District Office
13 First Street
Yarmouth, NS B5A 1S9
Telephone: (902) 742-8985
Email: cookja@gov.ns.ca

- *Attendees:* There were eight attendees including one scientist, three government representatives, one Forum coordinator, one individual and two representatives from the Tusket River Environmental Protection Association (TREPA). People were invited directly by faxes sent to DFO, NS Fisheries and Agriculture, NS Department of Natural Resources, individuals, TREPA and all municipal units within the designated area.

PRIORITY ISSUES

Area was divided into 3 regions:

1. Upper Watershed - identified as the headwaters or 'back country' areas where the Tusket and Clyde Rivers originate
2. Yarmouth Urban
3. Coastal Fringe which includes the band of development along the coastline for approximately 5 km inland and the near shore

Water Quality

- There are severe problems with contaminants, coastal debris and quality of storm water in all regions. There are moderate problems with bacteria and sediments. There is little information on nutrients.

Presence of Critical Habitats/Natural Areas

- All indicators showed moderate problems in all areas. Areas of particular concern are the wetlands in Yarmouth Urban and Coastal Fringe and the spawning and nursery areas in the upper watershed.

Changes in Species

- Not much information is available in this category.

The upper watershed shows severe problems. There are a number of endangered or protected plants and animals.

Use and Integrity of Riparian Zones

- The upper watershed shows severe problems in clearing and development of natural areas and increased erosion and sediment deposition. The clearing and development of natural areas is a more severe problem.

Changes in Resource Use

- The shift in target species and species introduction showed severe to moderate problems. Water use is a moderate problem while the shift from resource extraction to tourism/recreation use was less of a problem.

MAJOR CONCLUSIONS

- The upper watershed seems to have indicated the most severe problems out of the three regions. Concerns centered on environmental impacts of mining, improper forestry practices, dams for hydroelectric generation, wetland and watercourse alterations, and use of recreational vehicles or ATVs.
- The fisheries sector was not represented at the Forum due to the event conflicting with an important day in the fishery calendar.
- The coastal fringe is a highly developed area comprised of residential private lands, commercial uses and some forest and farm uses. With increasing demand for development of this area, public access is becoming severely limited. With development, degradation of water quality was seen as a major concern in this location.
- More monitoring is necessary to provide information and data especially in the areas of land use change inventories, systematic surveys of debris, measurement of water quality parameters, species inventories, and data collection and sharing.

Yarmouth - Lobster Bay Matrix

Indicator		Upper Watershed	Yarmouth Urban	Coastal Fringe	Total
Water Quality	Bacteria	?			
	Nutrients	?			?
	Sediments				
	Toxic Contaminants				
	Debris				
	Storm Water (Quality)	N/A			
Presence of Critical Habitats or Natural Areas	Benthic Habitat				
	Wetlands				?
	Nesting & Foraging Areas				
	Spawning & Nursery Areas			?	
	Protected Areas				
Changes in Species	Populations				
	Diversity			?	
	Dominance		?	?	
	Invaders	?	?		
	Endangered Species		?		
Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas				
	Replacement of Traditional Uses				
	Erosion and Deposition Changes				
Changes in Resource Use	Shift in Targeted Species				
	Species Introductions				
	Shift from Resource Extraction to Tourism/Recreational Use		N/A		
	Water Use/Management (plus stormwater)				

MINAS BASIN, NOVA SCOTIA

Minas Basin Forum

Location: Wolfville, Nova Scotia

Date: October 28, 2003

Convener:

Minas Basin Working Group (subgroup of the Bay of Fundy Ecosystem Partnership)

PO Box 115

ACER Acadia University

Wolfville, Nova Scotia B4P 2R6

Telephone: (902) 542-2201 ext 1311

- *Number of Attendees:* 26 participants from government, non-governmental organizations, researchers, resource users, scientists, managers and individuals.
- *Media Coverage/Public Education:* No public education. Invitations went out to those who were expected to be interested. An effort was made to reach out to community groups.
- *Was there good exchange of information from the general public to scientists and scientists to public?* It was not just an exchange between public and scientists but members of a broader category. The forum was focused on completing the matrix.
- *As a result of the forum, do more public and land-based managers understand the concept of the Gulf of Maine watershed than before?* Yes
- *As a result of the forum, do more public and land-based managers understand the concept of the water cycle than before?* Yes, many knew this already.
- *Any follow-on activities?* Not specifically.

PRIORITY ISSUES

[subdivided into Minas Channel, Cobequid Bay, Southern Bight, Central Minas Basin, Freshwater/Terrain, and Minas Basin watershed]

Water Quality

- Southern Bight has severe problems inshore with bacteria (coliform), nutrients and sediments. All subregions have moderate problems inshore and offshore in terms of toxic metal contaminants. Dissolved oxygen is not a problem in all of the areas. There are many gaps in the data.

Presence of Critical Habitats/Natural Areas

- Tidal barriers, dams and dykes are a severe problem in almost all areas. Nesting and foraging areas are good in Minas Channel, Cobequid Bay, and Central Minas Basin. Wetlands are a severe problem in Minas Channel, Southern Bight, Central Minas Basin, and a moderate problem in Cobequid Bay, Freshwater/Terrain, and Minas Basin watershed.

Changes in Species

- There are severe wildlife population declines in all watersheds except Minas Channel. There is much unknown about diversity. Invaders are only a moderate problem in Minas Basin watershed, a bit more severe in Freshwater/Terrain, and not much of a problem at all in the other watersheds.

Use and Integrity of Riparian Zones

- Southern Bight has severe problems in clearing and development of natural areas, replacement of traditional uses and erosion and deposition changes.

Changes in Resource Use

- The shift in pelagic species is a severe problem in all of the watersheds. Groundfish declines are a severe problem in all subregions except Cobequid Bay where it is unknown. There is much that is unknown.

MAJOR CONCLUSIONS

- Much is unknown.
- Of what is available, Southern Bight and Minas Basin watersheds are subregions of particular concern.
- It was valuable to have such a diverse group of people, representing many facets of use within the Minas Basin watershed collaborating at the Minas Basin Forum. This capacity for co-management is an essential component of successful environmental preservation and protection.

Minas Basin Matrix

Indicator	Overall Summary	
	Inshore	Offshore
Water Quality	Bacteria	
	Nutrients	
	Sediments	?
	Toxic Contaminants: Metals	
	Toxic Contaminants: Organics	?
	Dissolved Oxygen	
	Acidification	?
Presence of Critical Habitats or Natural Areas	Benthic Habitat	
	Wetlands	
	Nesting & Foraging Areas	
	Spawning & Nursery Areas	?
	Protected Areas	
	Beach & Intertidal	
	Tidal Barriers, Dams, and Dykes	
Changes in Species	Populations	
	Diversity	?
	Dominance	
	Invaders	
Changes in Use and Integrity of Water and Riparian Zones	Clearing & Development of Natural Areas	
	Replacement of Traditional Uses	
	Erosion and Deposition Changes	
Changes in Resource Use	Shift in Targeted Species	
	<i>Pelagic</i>	
	<i>Groundfish</i>	
	<i>Elasmobranchs</i>	
	<i>Lobster</i>	
	<i>Clams</i>	
	<i>Baitworms</i>	
	<i>Agricultural Species</i>	
	<i>Forestry Species</i>	
	Species Introductions	
	<i>Marine</i>	
	<i>Freshwater</i>	
	<i>Land</i>	
	Shift from Resource Extraction	

