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MINUTES OF THE SECOND ANNUAL MEETING OF THE ZONAL MONITORING PROGRAM FOR THE NORTHWEST ATLANTIC

Montreal
16-17 November 1999

J.-C. Thérriault,
Chair

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MINUTES OF THE SECOND ANNUAL MEETING OF THE ZONAL MONITORING PROGRAM FOR THE NORTHWEST ATLANTIC

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Executive summary

- The second annual coordination meeting for the implementation of the Zonal Monitoring Program for the Northwest Atlantic (AZMP) took place in Montréal (16-17 November1999);
- Representative members from the three Atlantic regions (Laurentian, Newfoundland and Maritimes) and from MEDS actively participated in this meeting;
- The objectives of the meeting 1999 were:
    1) to determine the content of the annual state of the ocean report, to determine the various regional / individual responsibilities, to sort out FOC vs AZMP responsibilities, and to decide on the form of the report, e.g., technical report, res-doc, etc;
    2) to determine what short- and long-term data analyses products and developments of climatic indices should be done; and,
    3) to determine the AZMP data management processes and responsibilities.

  These objectives were successfully achieved as reported in the Minutes of the 1999 AZMP meeting attached. In particular, a proposition was made for a standard presentation of data from the fixed stations and from the sections, the development of specific climatic indices was agreed upon, a specific plan for archiving the zonal monitoring data at MEDS was presented, and the proposed web site for the dissemination of these monitoring data was described.
- Request for comments on the proposed Terms of Reference for the **O**cean **M**onitoring **S**ubcommittee (OMS):
    - A more appropriate name for the present committee should be **A**tlantic **O**cean **M**onitoring **S**ubcommittee (AOMS);
    - There is redundancy in points 1 & 5 of the proposed mandate concerning the continuous reassessment of the program;
    - New Gulf Management Region should be individually represented on the committee;
    - Chairmanship should rotate among regions every 3 y, rather than the suggested 2, since the chair would “always be in transition” with the shorter term problems;
    - AZMP meetings: at least once a year is needed to discuss various aspects of the program;
    - It was agreed that the report coming out of our annual meeting should suffice and should meet reporting requirements for the ASDC. This report will be circulated to the Atlantic Directors of Science each year and will remain accessible through the AZMP web site at MEDS.
- Problems identified that should be brought to the attention of the science Directors by the AZMP chairman.
    - Cancellation of the spring survey without consultation of the AZMP representative raised problems for the Newfoundland monitoring program. Impact on AZMP should be taking into account when making such decision.
    - There was a consensus for a representation of the new Gulf Region on the committee.
    - Although it was generally considered an important but under- (or more accurately “un-”) sampled region, no funding is available for sampling a fixed station in the NE Gulf.
    - Overtime problem of the Maritime region
    - Use of ship of opportunity concept with CCG
    - Chairman replacement

- **Funding Summary**

AZMP + A-BASE FUNDING	LAURENTIAN		MARITIMES		NEWFOUNDLAND		MEDS	
	1998-1999	1999-2000	1998-1999	1999-2000	1998-1999	1999-2000	1998-1999	1999-2000
Total O&M	186.8	217.0	175.3	185.1	266.7	221.2	50.0	60.0
Salary / FTE	449.0 / 8.4	376.0 / 7.1	229.0 / 4.3	269.0 / 6.1	264.8 / 4.8	414.0 / 7.8	25.0 / 0.5	25.0 / 0.5
CPR			80.0	80.0				
Total (associated AZMP funding)	**636.6**	**593.0**	**484.3**	**534.1**	**530.7**	**535.2**	**75.0**	**85.0**
Total costs of other monitoring programs	81.0	75.0	69.0	69.0	33.0	33.0	----	----
Ship time (Dedicated to AZMP)	445.0	481.0	419.0	594.0	341.0	347.0	----	----
Total related monitoring funding	**1081.6**	**1074.0**	**972.3**	**1197.1**	**904.7**	**915.2**	**75.0**	**85.0**
AZMP allocation	265.0	265.0	345.0	345.0	265.0	265.0	20.0	20.0

MINUTES OF THE SECOND ANNUAL MEETING OF THE ZONAL MONITORING PROGRAM FOR THE NORTHWEST ATLANTIC

Crowne Plaza Hotel, Montreal
16-17 November 1999

Participants:

Colbourne, Eugene (Newfoundland)
Couture, Estelle (MEDS)
Devine, Laure (Laurentian / rapporteur)
Drinkwater, Ken (Maritimes)
Gilbert, Denis (Laurentian)
Gregory, Doug (Maritimes)
Harrison, Glen (Maritimes / rapporteur)
Harvey, Michel (Laurentian)
Helbig, Jim (Newfoundland)
Maillet, Gary (Newfoundland)
Narayanan, Savi (MEDS)
Pelchat, Bernard (Laurentian)
Pepin, Pierre (Newfoundland / rapporteur)
Petrie, Brian (Maritimes)
Plourde, Jacques (Laurentian)
Sameoto, Doug (Maritimes)
Starr, Michel (Laurentian)
Therriault, Jean-Claude (Laurentian / Chair)

PROPOSED AGENDA

1. Introduction (J.-C. Therriault)

- Welcome address with statement of general objectives for the meeting
- Review of the minutes of last meeting (23-25 Nov. 1998)
- Review/modifications/additions/acceptation of the proposed agenda
- Choice of rapporteurs

2. General session: (J.-C. Therriault)

- Proposed terms of reference for the Atlantic Ocean Monitoring Subcommittee (see document, in Annex 1)
- General overview of regional monitoring activities over the last 2 years (one general presentation by Laurentian, Maritimes and Newfoundland regions as well as by MEDS)

3. Data Analysis session (B. Petrie & P. Pepin)

- Status of the State of the Ocean Report :(K. Drinkwater, D. Gilbert & E. Colbourne and all other participants)
  - -Merging the FOC and AZMP reports
  - -Process and responsibilities
  - -Complementary physical data and analysis
  - -Addition of chemical and biological data
  - -Addition of fisheries component (R. Halliday?)
- CPR analysis for the AZMP report (D. Sameoto)
- Remote sensing maps (temperature, SeaWifs and *in situ* ground truth data) (G. Harrison & J.-C. Therriault)

- Physical and Chemical data analysis for AZMP (B. Petrie)
- Development of physical, chemical and biological climate indices (all participants)
  -Round table to express thoughts and new ideas and to report on efforts to date and on new development/modelling avenues
  -Realistic short and long term plan for development of climate indices.
- Modelling in the context of AZMP

4. Data Management session (S. Narayanan)

- Progress with biological database development (S. Narayanan, D. Gregory)
- Progress on web development (MEDS: E. Couture)
- AZMP web site (what should be on MEDS' vs Regional sites?)
- Data flow (S. Narayanan)
- Accessibility of monitoring data: data and web access policy
- Staffing and funding issues

5. Varia (J.-C. Therriault)

- AZM's place in LMR-GOOS
- Logistics / Intercomparison exercise
- Annual report of the AZMP subcommittee / report of meetings / MEDS web site
- Next meeting

The meeting will be held in the "Matisse" room and will start at 0900 on 16 November. It should end by 1630 on 17 November.

MINUTES OF THE MEETING (16-17 Nov. 1999)

1. Introduction (J.-C. Therriault)

Welcome address with statement of general objectives for the meeting

After a round table introduction, the Chairman (J.-C. Therriault) welcomed the participants and emphasised the importance of this particular meeting for the implementation of the Atlantic Zonal Monitoring Program (AZMP). He recalled that the emphasis of 1998 meeting was on logistics and the 1999 meeting should focus on Data Analysis and Data Management. J.-C. Therriault proposed three objectives for the 1999 meeting :

(1) to determine the content of the annual report on the state of the ocean, to determine the various regional/individual responsibilities, to decide on the form of the report, and to sort out FOC vs AZMP responsibilities in relation to the production of this report;
(2) to determine what short and long term data analyses products and climatic indices developments should be done; and,
(3) to determine the AZMP data management processes and responsibilities.

Review of the minutes from the last meeting (23-25 Nov. 1998)

Except for the fact that no specific report summarising the general activity of the AZMP was produced because of lack of time, no other significant problem was raised from the review of last year's meeting. The suggestion was made that this year's report should summarise AZMP's activities for the period 1998-2000.

Review/modifications/additions/acceptation of the proposed agenda

The proposed agenda was reviewed and minor changes were proposed (incorporated in agenda above).

Choice of rapporteurs

G. Harrison, P. Pepin and L. Devine were chosen as rapporteur to assist J.-C. Therriault, B. Petrie and S. Narayanan who will lead the different sessions (see below).

2. General session: (J.-C. Therriault / G. Harrison) = (lead / rapporteur)

Proposed terms of reference for the Atlantic Ocean Monitoring Subcommittee

- The first order of business was a request for comments on the proposed Terms of Reference for the Ocean Monitoring Subcommittee (OMS), circulated prior to the meeting **(see Annex I).** According to this document, it appears that this will be the new name of the present committee, which deals with the AZMP (although AOMS-**A**tlantic **O**cean **M**onitoring **S**ubcommittee would better reflect the reality!).
  - J.-C. Therriault started the discussion by expressing some reservations about the mandate. Specifically, there appeared to be some redundancy in points 1 & 5 of the proposed mandate concerning the continuous reassessment of the program. Another question arose concerning point 4, i.e., reports and assessment. It was noted (P. Pepin) that as a minimum, CSAS SSRs would constitute our scientific reports and indicated that they would be assessed (peer reviewed) at the annual FOC meeting. Another comment about the mandate indicated a desire to have point 6, regarding client questions, clarified. Discussion focussed on the role of the Monitoring Subcommittee (4 members) in fielding questions and touched on the issue of questions that might require consultation with the Atlantic Zone Directors before responding.

- Subcommittee membership was discussed next. A comment was made that the new Gulf management region was not individually represented, but should be.
- Subcommittee chairmanship was discussed next. J.-C. Therriault suggested that the term should be 3 y., rather than the suggested 2, since the chair would "always be in transition" with the shorter term.
- Nothing else substantive about the Terms of Reference was brought up. It was reiterated, however, that accountability of the AZMP is to the Atlantic Directors.
- There was some discussion about the frequency of AZMP meetings: the consensus was that at least once a year is needed to discuss various aspects of the program. This is in addition to the annual presentations of observations that are to be made at the FOC.
- The final discussion concerned the requirement for an annual report. It was agreed that the report coming out of our annual meeting should suffice and should meet reporting requirements for the ASDC. This report will be available through the AZMP web site at MEDS.

- The next order of business was the regional overviews of monitoring activities for 1998 and 1999.
  - P. Pepin described monitoring activities in Newfoundland **(see summary in Annex II).** Spring/summer cruises and ships-of-opportunity survey sampling, including STN 27 fixed-station sampling, were highlighted. The question of vessel requirements for STN 27 was raised; the 45ft long-liner used this past year has significant weather limitations. In addition, the cancellation of the spring survey without consultation of the AZMP was raised and the suggestion was made that J.-C. Therriault should bring this up with the Atlantic Directors since this is as much a zonal as regional issue.
  - D.Gilbert followed with highlights of monitoring activities in the Gulf of St. Lawrence **(See summary in Annex III).** Tabulations of the sampling frequency for the fixed and survey stations were made. Much of the discussion centered on the problems encountered in getting critical sampling done using Coast Guard ships opportunistically, e.g. some of the important spring / early samplings were missed due to unavailability of sampling platforms at that time. This is another issue identified as requiring further discussion with the Atlantic Directors. A detailed breakdown of expenditures, personnel and data products was also described by Denis. There was some discussion about sampling and analysis protocols and the overtime issue was raised.
  - B. Petrie wrapped up the regional reviews by discussing monitoring activities in the Maritimes region **(see Annex IV).** He led in with an overview of personnel (2 new permanent, one term and one contract staff were hired in 1999 for monitoring) and the sampling program, including what has been done at the fixed stations, survey stations and on groundfish surveys on the Scotian Shelf and in the Southern Gulf. Discussion then shifted to some of the data transfer problems we have encountered (IGOSS messages being rejected) and the origins of and possible solutions for these problems. The existing (MCSST) and new (SeaWiFS) electronic satellite product databases were described. Some discussion about whether IML would be producing a similar SST electronic product ensued. Brian then discussed budgetary issues. Out of that discussion came a request for all regions to provide J.-C. Therriault with a standardized budgetary breakdown for his report of this meeting, including an estimate of A-base commitments to AZMP.(See Annexes II,III & IV). A question was raised again about the new Gulf region and whether Moncton should have a representative at the AZMP meetings; consensus was yes. The question was also raised whether the AZMP should consider a fixed station in the NE Gulf because it was generally considered an important but under- (or more accurately "un-") sampled region. J.-C. Therriault indicated that while there is a very strong justification for its inclusion in the program, the program funding is insufficient to allow sampling. This is another question that should be raised with the Atlantic Science Directors.
  - The session wrapped up with K. Drinkwater briefing the AZMP attendees on the number and nature of the reports (SSRs and Res Docs) that have been produced and presented at the FOC in the past. These include regional environmental reports and a zonal overview. He assured the group that he will continue to assist in producing these reports although they now fall within the responsibility of AZMP.

– Some discussion then ensued on what reports would be required by AZMP for the FOC in February 2000 (this was discussed further on the following day). The session ended with some discussion on "indices". It was concluded that some standardized measure of mixed-layer depth and an index of stratification were two hydrographic properties of particular interest to the biologists.

3. Data Analysis session (B. Petrie / P. Pepin)

- The Data Analysis Subcommittee (DAS) started its discussion with a detailed review of the data products and analyses that were routinely presented to the Fisheries Oceanography Committee (FOC). Routine presentations detailing the state of the atmospheric environment (by K. Drinkwater, BIO) and state of the physical marine environment (one for each region: K. Drinkwater (Maritimes), D. Gilbert (Quebec), E. Colbourne (Newfoundland)) were identified as critical elements that would have to be undertaken by AZMP if the individuals / regions that produced them were to cease the undertaking of the required analyses. However, it is clear at this time that those individuals intend to continue the development and presentation of those analyses. It should be noted, however, that J. Plourde will gradually D. Gilbert for IML. In addition to the three regional environmental overviews, an overall comprehensive document is produced and presented to RAP and international (e.g. NAFO) meetings as required.

- These general overviews of previously issued data products were followed by a number of proposed data products based on the new information being collected routinely as part of the AZMP. Collection of biological data using the Continuous Plankton Recorder has shown major changes in the abundance of many groups of phyto- and zooplankton along both the E (St. John's Halifax - Gulf of Maine) and Z (Iceland - St. John's) lines on a monthly basis, which are echoed in collections based on standard ring nets from standard transects on the Scotian Shelf. After discussion, the subcommittee agreed that analyses to be presented at the FOC February meeting would include an analysis of colour (a reflection of phytoplankton abundance), major zooplankton species, and relative abundances of diatoms and dinoflagellates as well as small and large copepods. Efforts would be directed towards establishing whether there have been major shifts in the seasonal cycle during the periods of collection (1958 - 1985, 1992- present for the Z-line; 1961- 1975, 1991- present for the E-line).

- Satellite-based observations of Sea Surface Temperature (SST) and Ocean Colour (SEAWIFS) are available to the AZMP. The group at IML is currently developing in-house algorithms to deal with navigation and cloud-ice detection to ensure that an SST database (of varying resolution) of weekly images is available online for all AZMP scientists. Routine processing of this information should be available by September 2000. In the interim the AZMP will continue to use the bi-weekly observations of the 18km grid produced by JPL (Jet Propulsion Laboratory). B. Petrie (BIO) has developed a climatological field (based on 1981-96) from which anomalies can be calculated for the period of the AZMP. This will be presented at the February 2000 meeting for all regions. IML will also consider the creation of a geographically / temporally referenced database of the SST data. Initially their intention was to make a gallery of images available without the accompanying digital data. J.-C. Therriault indicated, after we raised the issue, that his group will consider our request for a true database, i.e. the SSTs. He hoped that this decision would be made by December 1999 and he would let us know before the FOC meeting).

- The database for Ocean Colour is not as extensive as that for SST because the sensor has only been flying for a limited period (September 1997 to present). Glen Harrison indicated that two-week composite images are routinely produced by BIO and that the composites and the daily passes are available from the OSD website (www.mar.dfo-mpo.gc.ca/science/ocean /welcome .html). An online database (9 km resolution) is being developed and may be available in early 2000. He identified 20 areas corresponding to regions with long term hydrographic time series for which basic statistical information would be computed and presented at the February meeting. The information could be contrasted with observations of phytoplankton and chlorophyll concentration that are collected routinely.

- A standardized format for presentation of data from sections and fixed stations was developed (see below). The underlying goal is to provide insight into environmental conditions relative to a climatological (long term) average. In some instances, there is some information already available from which such averages can be developed but in other cases, collections based on the AZMP represent the first data available.

- One of the critical elements needed to link variations in the physical and biological variables involves the estimation of stratification intensity and variability. Stratification influences chemical fluxes, biological activity and vertical mixing. DAS requested that each region explore approaches to describing or indexing this state variable as a routine element of the Monitoring Program.

- Following the proposals and the approach to be taken for the analysis of fixed stations, sections and blocks, the subcommittee identified the structure of advisory reports to be provided on a routine basis. Each region would produce Research Documents separately outlining the available information concerning the physical and the biological / chemical environment. Data for both biological and chemical information would be presented in one document because of the linkage between nutrient availability and biological production (Table 1).

TABLE 1.

Region	Physical Oceanography	Biology/Chemistry
Newfoundland	E. Colbourne	P. Pepin
Maritimes	K. Drinkwater	G. Harrison
Gulf of St. Lawrence	J. Plourde	M. Starr, M. Harvey

In addition, K. Drinkwater and P. Pepin will work to produce general environmental overviews that include all regions and disciplines.

- The AZMP report will include all environmental overviews as well as Research Documents for each region. An executive summary outlining the observations from sections, fixed stations, CPR and satellite data will be developed to provide a scorecard of general environmental conditions.

- Methodological concerns were raised throughout the presentation about what types of algorithms are to be applied for specific tasks, etc. Of particular importance were the issues associated with interpolation schemes used to generate contours of state variables. It was considered that although these issues are important, a separate meeting of the subcommittee should be held to discuss methodological issues relevant to the analysis and interpretation of data collected as part of AZMP. A similar conclusion was reached concerning the role of modeling in interpreting observations and evaluating methodological approaches and needs of the AZMP as well as the development of "summary indices" that encapsulate general environmental conditions. A date for the meeting has not been set.

Proposed presentation of data from sections and fixed stations

SECTIONS

Temperature (T), Salinity (S), Density (ρ), and Oxygen (O_2) long-term means of depth-dependent contoured sections were computed and presented as part of routine work for FOC: To be continued for AZMP. Annual reports present anomalies from long-term means.

Additions for future years:

Similar depth-dependent contour plots of climatological mean standard sections and anomalies for calibrated fluorescence (F), extracted chlorophyll and nutrients (NO_2/NO_3, PO_4 and SiO_2 from bottle data). [µM]

Depth-integrated chlorophyll biomass of phytoplankton (Chl *a* [$mg.m^{-2}$])and zooplankton (mg dry wt m^{-2}]). (long-term means and anomalies)

Depth-integrated abundance [# m^{-2}] of dominant zooplankton species.
(long-term means and anomalies)

Depth-integrated species diversity of dominant phytoplankton (water column means from pooled samples) and zooplankton. (long-term means and anomalies)

Average depth-integrated chlorophyll and zooplankton abundance along each transect. (long-term means and anomalies)

Produce cross sectional maps of $\partial\rho/\partial z$ along all standard transects and calculate the climatological mean. Compute depth of maximum $\partial\rho/\partial z$ (i.e., mixed layer depth) and report maximum. (long-term means and anomalies)

Stratification Index $\partial\rho/\partial z$ for z=30 and 50m. (long-term means and anomalies)

It is essential, where possible, that presentations be made relative to some form of long-term mean (i.e., climatology, even if the period is short) so that we can discuss the patterns in terms of anomalies.

Relationships to explore:

I. Along-transect distribution of phytoplankton anomalies and variations in the physical variables.
II. Extend to zooplankton.
III. Are there similarities within *vs* among years?

Standard Sections (for 1999):

NF Southeast Shoal (late summer, fall)
Flemish Cap (summer, fall)
Bonavista (spring, summer, fall)
Hamilton Bank (summer)

FIXED STATION (St. John's Station 27)

Temperature (T), Salinity (S), Density (ρ), and Oxygen (O_2) long-term means of contoured depth-dependent seasonal pattern variations were computed and presented as part of routine work for FOC: To be continued for AZMP. Anomalies reported relative to long-term means.

Additions from AZMP:

Similar seasonal depth-dependent contour plots climatological mean sections for calibrated fluorescence (F), extracted chlorophyll and nutrients (NO_2/NO_3, PO_4 and SiO_2 from bottle data). [µM] (long-term means and anomalies)

Seasonal depth-integrated chlorophyll biomass of phytoplankton (Chl a [mg m^{-2}])and zooplankton (mg dry wt m^{-2}). (long-term means and anomalies)

Depth-integrated abundance [# m^{-2}] of dominant zooplankton species. (long-term means and anomalies)

Depth-integrated species diversity of dominant phytoplankton (water column means from pooled samples) and zooplankton. (long-term means and anomalies)

Produce time-depth countours of $\partial\rho/\partial z$ at all standard stations and calculate the climatological mean. Compute depth of maximum $\partial\rho/\partial z$ [i.e., mixed layer depth] and report maximum. (long-term means and anomalies)

Stratification Index $\partial\rho/\partial z$ for z=30 and 50m. (long-term means and anomalies)

4. Data Management session (S. Narayanan / L. Devine)

- S.Narayanan started her discussion of AZMP data management by reviewing the main objectives for 1999 that were presented to the AZMP Steering Committee last February after the November 1998 meeting:
  - Complete the development of the biological database and enter at least three major data sets into it (Sameoto's Oracle zooplankton data base, Strain's nutrient data set, Platt's plankton data set). These three constitute a significant portion of the biological data in the Maritimes Region that are relevant to AZMP.
  - Complete a web-based query system to help users identify data collections of interest.
  - Implement the AZMP WWW site for data, products, and documents.
  - Coordinate and implement standard procedures for quality control, processing, archiving, and dissemination of the AZMP's data and make data available in a timely manner as required.

- S. Narayanan noted that considerable resources have been leveraged for the AZMP data management from other sources in BIO, from the Ocean Climate Program and from MEDS, allowing the hiring of informatics experts for the implementation of the model (see MEDS' reports in Annex V). The Maritimes region has taken responsibility for the biological database development by implementing the data model in coordination with regional informatics personnel. Following a first phase of implementation at BIO, a two-day workshop, attended by personnel from MEDS, NWAFC, MLI, and IOS, was held at BIO in September 1999 to review progress and decide on the future direction. Action items and time limits were decided on at the end of the meeting.

- S. Narayanan turned the floor over to D. Gregory. He reported that there was now Web access to the physics databases (climate chip-based measurements, SST [AVHRR, satellite data], ODI (moored instrument data) but that the process for getting SeaWiFs data into SST has not yet been resolved. He then turned his attention to the biological-chemical database, giving first a brief history of its conception at the carbon data archive meeting in November 1997, the subsequent data modeling exercise in August 1998, the September1998 workshop to present and revise the model, and the presentation of the revised model at last year's AZMP meeting, where it was accepted as the model for biological and chemical data resulting from the AZMP.

- In December 1998, BIO took advantage of the Y2K funding to further development and implementation of the database. In April 1999, it was decided that the chemistry, cruise, and nutrient databases as well as the zooplankton and phytoplankton data sets would be merged with the BIOCHEM project. The September 1999 workshop at BIO was held to bring concerned personnel in other regions up to date since all the work has been done at BIO. At this meeting, participants reviewed the data model and the application software written to date, recommended improvements to the system, and developed a plan of action for the next few months. All agreed that it was important to have something concrete by the end of the year.

- Doug then presented a schedule for the completion of the database development:
  - Jan. 2000—complete development for an operational system
  - Feb. 2000—complete testing and validation
  - March 2000—deployment in Maritimes region, with migration of all nutrient and cruise databases as well as the phytoplankton and "Sameoto" zooplankton completed by the end of fiscal year.

He added that these deadlines could be affected if there are Y2K problems with other systems. AZMP data are being entered, and SSIP and CPR data will also be imported.

- Doug foresees transferring the application to NWAFC, MLI, and MEDS by the end of March 2000. He expects that there will be further tweaking of the system necessary in 2000, 2001, and beyond, and added that the inclusion of all biological data from the Maritimes Region will take years. He proposed the strategy of importing basic data types first and then trying to deal with trickier ones like grazing rates and sediment trap data. The high cost of informatics expertise necessary to finish the work was discussed. There is funding through the end of the year; beyond that, it is hoped that the Ocean Climate Program Committee might contribute if they think the project looks promising. Savi and Doug will look at the options for such support. B. Pelchat said that IML would like to start trial data loading with a database prototype prior to the end of the year.

- Doug continued his presentation by discussing the issues that still need to be resolved:
  - Mechanisms for exchanging and sharing data
  - Duplicates—is this an issue for BIOCHEM or MEDS to resolve?
  - Is the ultimate goal to make the database available as a regional deployment? Internet? Intranet?

  It was proposed that system access could be controlled by password. Code table maintenance will also be troublesome. It was tentatively decided that MEDS would look after the code tables with some sort of mechanism allowing the regions to assign temporary codes when needed and then having annual updates.

- K. Drinkwater asked if the database would include ichthyoplankton. The answer was yes, for example, the SSIP and FAP legacy data sets will be included, but the fisheries data is in a separate system. B. Petrie asked if T and S data are included; the response was that these data would be included when associated with other chemical or biological measurements (e.g., nutrients, chl, plankton). Other comments related to the concept of the term "event": the database shows relationships between data that were collected to "go together," but these relationships are not always obvious with archive data. Rather than trying to determine these connections when the data are loaded, the user who queries the database will determine them with time–space restrictions. D. Sameoto brought up the subject of non-vertical tows, e.g., batfish, V-fin data; these data types had all been considered when the data model was created and have a place in the database. Finally, the discussion about the biological database finished with a comment that the database is intended to be an archival one and that it is important to keep the data in the original format to remain useful to the scientists.

- S. Narayanan then introduced E. Couture who presented the prototype of MEDS' Web site for AZMP data. The home page has links to the national data inventory system, a section for AZMP-related documents, a section for links to other relevant web sites, and the section leading to data and data products. The section

concerning data and data products contained the sections profile data, sea levels, plankton, remote sensing, ice cover, fish surveys, and meteorological data.

- In the profile data subsection, the user is given the option to look at a fixed station data, section data, or to use a search page to retrieve data in the AZMP area from MEDS archives. On the search page, the user selects a variable, a time range, and an area either by "clicking and dragging" on the map or by entering the coordinates manually.

- The fixed station "data" category was divided into three subcategories (CTD, Winkler 0_2 / Chl*a* / Secchi depth, and nutrients). Each shows an inventory of the data, graphs of each profile, waterfall plots of the variables, and allows the user to view and save CTD data. The CTD subcategory distinguishes between high and low resolution CTD data. The "data products" subsection shows contour plots of data for the past year, climatology for the past 30 years, data available at MEDS, and relevant links to other web sites concerning the fixed stations.

- The section "data" category was subdivided as above (CTD, WinklerO2/Chl*a*/Secchi depth, nutrients). All three categories show an inventory of section samplings, contour plots for each sampling, and CSV (comma-separated value) files of data that can be viewed and saved.

- The sea level data subsection was also presented. This subsection shows a "clickable" map of the tide gauge stations. The data for each station is divided in three time spans (current year, last five years, and all the historical data holdings at MEDS). Current year data is displayed by month whereas the last five years are displayed by year. The data shown includes hourly heights and hourly heights passed through a Godin tide filter. The data are presented graphically and in a CSV file that can be viewed and saved. Historical data holdings are presented graphically but the data are not available on-line. The data is only available through MEDS using a request form; a link has been provided for that purpose.

- The plankton data subsection will be developed after the BIOCHEM database becomes available. Remote sensing, ice cover, fish surveys, and meteorological data were briefly discussed. These subsections were mainly links to other web sites. Estelle has asked the participants to provide links to their regions that are pertinent to these subsections.

- Meeting participants commented on the presentation:
  - Savi asked that the regions supply lat/long positions for the fixed stations and the standard stations along the sections (perhaps rectangles around the sections);
  - It was suggested that the fixed station/section profile data be presented as "continuous" instead of "CTD" and that Winkler/Chl*a*/Secchi depth and nutrients be combined as "discrete";
  - It was suggested that CTD variables be presented on the same set of axes instead of separately and that density be included;
  - It was suggested that discrete samples be superimposed on the CTD profile graphs;
  - It was suggested that discrete data be presented together in the same flat file and that the associated discrete temperature and salinity data be included;
  - Waterfall plots for discrete oxygen and for chlorophyll *a* are not necessary;
  - It was suggested that nutrients be presented on the same graph and that symbols be added to the curve to show the data points;
  - For contour plots of the fixed stations, it was suggested that MEDS do a linear interpolation of the data unless there is a 60 day or more data gap and that markers be placed at the top to identify sampling dates;
  - It was suggested that contour plot scales be determined using long-term climatologies for each of the stations;

- Since interpolation of data in a contour plot can generate false features, it was suggested that one representative from each region look at the contour plots before they are placed on the web site;
- Estelle asked the participants to supply the 1961-1990 climatologies for their region if available. D. Gilbert said IML can only supply climatologies of the last five years since sampling at the monitoring stations only began in 1995. Such climatologies have not been computed yet;
- For the sections, it would be useful to have indications of station positions above the contours;
- BIO participants suggested that the software "Ocean View" be considered for contouring;
- On the search page, the participants suggested adding maps showing the location of data holdings at MEDS for each variable;
- In the sea level subsection, the participants would like to see "adjusted sea level" (corrected for change in atmospheric pressure) data as well as SL;
- Plankton data via the BIOCHEM database are not yet available;
- The section “ice cover” is a link to the Canadian Ice Service; K. Drinkwater suggests a link to the GSL (F. Saucier, IML) and Newfoundland databases;
- A data category should be added for long-term temperature monitoring (thermographs);
- The participants also suggested adding climate indices to the AZMP web page.

All meeting participants were pleased with the Web site design.

- D. Gregory noted that there is a considerable amount of duplication between the BIO web site and AZMP web site proposed by MEDS, particularly in the area on long term indices. BIO is finding it difficult to maintain these series and suggested the responsibility for maintaining them on the web become part of the AZMP site. Doug promised to review the BIO products, particularly those that were also FOC indices and get back to Estelle with a proposal to transfer some of the indices from the BIO site to the AZMP pages.

- S. Narayanan continued with the third agenda item within the data management section of the meeting, the question of what information should be on the MEDS vs. the regional Web sites. It was suggested that near real-time data and data concerning the zonal program be sent to MEDS. MEDS could present indices (e.g., NAO, climate variability) and have a common representation for the same data types. It was agreed that MEDS would not do any analysis, just display products. Regional sites could show more value-added products.

- Data flow was the next topic. There is good cooperation from the regions with sending IGOSS messages to MEDS. The modified IGOSS message was discussed that will include dissolved oxygen and fluorescence. Discussion on the new format included the appropriate units for O_2 (μM), how many places after the decimal to report data (two), and that fluorescence should be reported as raw voltage rather than converted to units of chl. Winkler titrations of dissolved oxygen and Secchi depth should also be sent to MEDS in near real-time. MEDS has received bottle-type data (nutrients, chl, Winkler O_2) from IML’s fixed stations for 1996-1998. A stable data exchange format should be agreed upon to make data flow smoother. It was emphasized that monitoring data should be publicly available as soon as possible.

- For the final data management point, funding and staffing, Savi reported the recent hiring of C. Guay at MEDS for additional Oracle expertise with the BIOCHEM project (Claude has been responsible for NCIS at IML for the past several years). In addition to the funds allocated by AZMP, the data management committee received an additional 48K to help implant the model nationally. Until now, the resources have been used to continue implantation at BIO and to migrate UBC biology data to DFO through IOS. Support was also provided to enhance the national nutrient database. It was suggested that regions make inventories of data-sets and try to estimate the resources necessary to move the data into the database. It was agreed that such estimates are very difficult to make. B. Pelchat said that with the limited human resources available, IML was planning to put recent data into the database and address historical data considering demand and as time allows.

5. Varia (J.-C. Therriault / L. Devine)

AZMP's place in LMR-GOOS (Living Marine Resources–Global Ocean Observing System)

- Glen Harrison gave a brief over-view of the Canadian contribution to the ocean component of GOOS. The four modules of GOOS are climate, health of the oceans, coastal, and living marine resources. The LMR module has lagged behind the others and is still in the conceptual stage. To fulfill the module's goal, a comprehensive ecosystem and environmental observational program is required that identifies variables of importance for detection of changes in structure, behavior, and biodiversity, including the status of fisheries resources. Mike Sinclair's "ecosystem approach" was discussed, with two broad objectives: the maintenance of biodiversity and habitat productivity. Glen raised the question of how the Atlantic Zonal Monitoring Program fits into this larger program and thought that the AZMP should compile a list of what measurements are made that are relevant and also think about the thresholds and alarm points for certain variables. He added that this is another long-term project that could support the AZMP. Glen distributed a summary of the LMR-GOOS project and asked that participants send him feedback.

Logistics and intercomparison exercise.

- J.-C. Therriault would like to see protocols drawn up for each data type. Methods for zoo- and phytoplankton must be standardized among the regions (e.g., mesh size, preservation method, biomass determination). J.-Claude received a message from NOAA about conducting an intercomparison exercise for nutrients, dissolved oxygen and pigments. It was suggested that Peter Strain could coordinate the exercise with members from the logistics subcommittee (A. Gagné, IML; G. Maillet, Newfoundland; M. Mitchell, Maritimes).

Annual report of the AZMP subcommittee / report of meetings / MEDS web site

- The group discussed the contents of the AZMP annual report. Items mentioned were the budget summary and references to the reports that were produced for the project; the Web site can be used to convey data and other information.

Varia

- As a final point of discussion, D. Sameoto brought up several problems that arise with collection of zooplankton: there can be order-of-magnitude differences in the amount of material collected between calm and rough days because the net empties in rough weather; tows with the 200 μm collect too much phytoplankton during blooms—it is impossible to get accurate biomass determinations. It was suggested tow speed be increased in rough weather to alleviate the first problem and that bigger mesh size (250 or 333 μm) be tried to lessen net clogging.

Date of next meeting

- The date for the next AZMP meeting was not fixed but there was a general agreement that November was a suitable time of the year to hold the annual meeting .

ANNEX I

Proposed Terms of Reference
Ocean Monitoring Subcommittee

Background: Ocean monitoring is defined as the collection of data on an ongoing basis to obtain a quantitative description of the variability of key physical, chemical, and biological characteristics of marine waters in a particular region. Ocean monitoring is needed to understand environment - fisheries interactions, to detect and quantify climate changes, to make predictions, to validate models, and to provide historical and on-line data in support of marine activities (e.g., fisheries, energy, transportation). Model development itself also plays an important role in advancing our ability to predict future events that may impact on marine resources and the livelihood of clients.

Purpose / Mission Statement: To transcend regional boundaries so as to ensure the long term integrity of a zonal monitoring system covering the Atlantic Canadian shelves, to address scientific issues related to ocean monitoring and ultimately to serve DFO, it's clients and the public better.

Mandate:

1. To assume, for the whole Atlantic zone, the general responsibility for the coordination and integration of DFO's ocean science monitoring activities on a continuous basis in order to develop and maintain a permanent monitoring program, to continuously reassess this program and to develop efficient relationships and adequate and timely deliverables for DFO's internal and external clients;
2. To assume full responsibility for all logistical aspects related to the execution and maintenance of the Zonal Monitoring Program. This may include responsibility for ensuring / acquiring / requesting ship time and necessary sampling equipment, for standardisation of sampling procedures, methods and techniques, for standardisation of laboratory analysis including phyto- and zooplankton counting , for the acquisition, validation and compilation of monitoring data coming from different sources, etc.;
3. To assume full responsibility for coordinating and implementing standard procedures for quality control, processing, archiving, and disseminating the Program's data, following recognized national and international standards;
4. To provide advice and guidance, co-ordinate and to supervise, at the zonal level, the DFO personnel carrying out data analyses of historic and acquired monitoring data in order to produce the different peer reviewed annual reports on the state of the environment as well as other necessary reports (e.g., forecast in the trends of climate changes) and/or environmental indices that are requested by different clients. These reports will be published as part of the CSAS SSR series;
5. To continuously reassess the validity of the Program;
6. To respond to immediate questions posed by clients as necessary, and;
7. To work closely, on an ongoing basis, with the Fisheries Oceanography Subcommittee in order to help advance the understandings of interactions between marine resources and their environment.

Name: Ocean Monitoring Subcommittee (OMS)

Membership: Core membership will be comprised of 1 representative from each of the 4 Atlantic Regions as well as 1 representative from Ottawa (NHQ). Members will be appointed by Regional Directors of Science in consultation with Oceans Directors where appropriate.
Participation by other interested DFO staff as well as clients and client groups shall be encouraged.

Chair: The Chairperson will be selected by the Atlantic Science Director's Committee and will serve for a 2-year term. Chairs may not necessarily be chosen from the core membership. Chairs will be rotated among regions.

Structure: The Subcommittee may, as it deems appropriate, establish various working groups to deal with various aspects of its mandate. The Subcommittee will ensure full regional representation on any working groups including NHQ. The Subcommittee will establish clear ToR's for working groups as well as appoint chairpersons.

Accountability: The Subcommittee reports to, and is accountable to the Atlantic Science Directors Committee (ASDC). (WE WILL NEED TO DISCUSS THIS ASPECT IN RELATION TO CSAS AND THEIR MANDATE)

Meetings: The Subcommittee shall meet at least once per year. Other meetings, teleconferences or videoconferences may be called as necessary. Working group meetings will be scheduled as appropriate by WG chairs through consultation with the Subcommittee.
Meeting locations will be rotated amongst the different Atlantic regions. Host regions will be responsible for meeting arrangements.

Secretariat: Administrative and secretarial services in support of the Subcommittee will be provided by the region of the Chair.

Costs: Travel and accommodation costs will be covered by each individual participant from their regional budgets.

Reporting: Minutes of all meetings, conference calls, etc. will be maintained including capture of all different or divergent points of view. These will be provided to the ASDC on an ongoing basis.
Annual final reports of all meetings, conference calls, etc. during the year will be prepared and included in the CSAS Proceedings Series.
Annual reports on the state of the ocean environment will be provided annually in the SSR series of CSAS.

Decisions and Recommendations: In addition to the above, the ASDC will be kept informed via summary reports, on an ongoing basis, of all decisions and recommendations arising from the Subcommittee and its working groups including analysis of resource implications and risk assessment.

ANNEX II

NEWFOUNDLAND REGION: SUMMARY OF ZONAL MONITORING ACTIVITIES 1998-2000

Fixed Station

Located 5 km from the mouth of St. John's harbour, the station is routinely sampled using ships-of-opportunity using CTDs as well as 200 micron vertical net tows. In addition, the station is being sampled regularly using CTD, nutrients, chlorophyll, salinity, dissolved oxygen and plankton tows (70 and 200 micron).

Problems: Securing vessel time for Station 27 has been somewhat problematic until very recently because of vessel limitations, which places severe constraints because of sea-state restrictions. With increased staff as a result of rejuvenation, more sampling can be carried out with little advance warning.

1998:	42 CTD	10 Detailed sampling
1999:	47 CTD	12 Detailed sampling

Sections

Sampling of selected sections was carried out using both dedicated cruises as well as using ships-of-opportunity (SOP). Sampling includes complete hydrographic collections as well as nutrient, chlorophyll, phytoplankton and zooplankton. In 1998 the Southeast Shoal section was occupied in May and August using a dedicated cruise and SOP, respectively. The Flemish Cap and Bonavista transects were sampled in both May and July from dedicated cruises as well the Seal Island line (in July). In 1999 a scheduled spring cruise was cancelled by management but we were able to sample the Bonavista line in May using SOP. However more complete regional sampling was only possible for temperature because of a surplus of XBTs transferred from DND. The Bonavista line as well as the Flemish Cap line were also sampled in July and November from dedicated cruises. The Seal Island transect was sampled in July and the Southeast Shoal line was sampled in November.

Problems: The unjustified cancellation of the 1999 spring cruise substantially impacted our regional ability to both monitor and establish the cause of variations in biological production from a regional perspective. Because of the expanse of the region, erosion of sea-going activities will have a substantial impact on the monitoring program's capacity to detect and explain variations in the marine environment.

Personnel

The three rejuvenation positions associated with the program were staffed in 1999. G. Maillett was hired in the position of Biological Oceanographer (BI-2) supported by S. Fraser (EG-3) in addition to a previously staffed position (EG-4, D. Lane). Their efforts are directed toward the biological aspects of the monitoring program. J. Craig (PC-2) was hired to provide field and analytical support in the physical oceanography group.

Budgetary Summary

After converting unused salary dollars to O&M funds, the allotments for the program were $201K in 1998 and $145K in 1999-2000 (following a 5% clawback of funds). To this point, overtime costs have been covered by the Regional Director.

Salary funds, available because of delays in filling permanent positions in 1998, were used for recalibration and repairs to CTD systems used throughout the Science Branch.

Newfoundland region: AZMP+ A-Base Funding	**1998-99 $K**	**1999-2000 $K**
O&M:		
Equipment maintenance	62.0	37.0
Data Processing	21.0	5.0
Sampling equipment	34.0	24.0
Sample processing	35.0	50.0
Contract staff	16.0	0.0
Expendable (field supplies)	11.0	18.0
Meetings	12.0	11.0
Capital	10.0	0.0
Overtime	65.7	76.2
Total O&M	**266.7**	**221.2**
Salary/FTE's	**264 / 4.8**	**414 / 7.8**
Total (Direct AZMP funding)	**530.7**	**635.2**

Other Monitoring programs	**1998-99 $K**	**1999-2000 $K**
Fish surveys	20.0	20.0
Remote sensing	5.0	5.0
LTTMP	8.0	8.0
Total	**33.0**	**33.0**

Ship time (dedicated to AZMP)	**341.0**	**247.0**

Total monitoring related funding	**904.7**	**915.2**

AZMP Allocation	**265.0**	**265.0**

ANNEX III

LAURENTIAN REGION: SUMMARY OF ZONAL MONITORING ACTIVITIES 1998-2000

Oceanographic Sampling

Fixed Stations

Gaspé Current, located in the Gaspé Current, near Mont-Louis, about 4 km from the coastline
and
Anticosti Gyre, located in the middle of the Anticosti Gyre, about 52 km from the north shore and 57 km from the south shore.

Sampling planned every 2 weeks on an opportunity basis starting in 1998. Standards measurements included : CTD, nutrients, chlorophyll, salinity, dissolved oxygen, net tows (200 μm and 76 μm).

Problems: Securing ship time for the Gaspé Current and Anticosti Gyre stations has been a problem particularly during the spring months (March-April, and even May in 1998). The major factor has been that a CCG ship is required to escort the ship Nordic Express all the way to Blanc Sablon every week due to ice presence (*trips back and forth require 4 to 5 days each*). Another factor is the lower priority placed on the occupation of stations compared with other vessel activities such as search and rescue. Unfortunately, the standby positions of CCG Search & Rescue ships changed frequently over time in the northwest Gulf. For example, a SAR ship based in Matane (*ideal location for IML staff*) for many years was moved to Sept-Îles in 1996, when changes were made to the fleet due to budget cutbacks.

In 1998, notice of CCG ship availability to AZMP personnel with insufficient lead time (a few hours only) caused several missed outings. This situation was corrected in 1999 through better two-way communication between CCG and AZMP personnel. D. Gilbert made a presentation at a November 1999 meeting of the CCG commanders in Québec City to talk about the importance of ocean monitoring and discuss the negative consequences of long sampling gaps for the monitoring program's capacity to detect and explain variations in the marine environment.

A summary of the fixed station occupations is given in Tables 1 and 2 below. The stations were occupied only 9 times in 1998 compared with 22 times in 1999.

Sections

The St. Lawrence Estuary, Mont-Louis, Anticosti, Magdalen Islands and Northeast Gulf sections were occupied during the November 1998 and December 1999 ice forecast cruises (CTD, dissolved oxygen, chl*a* nutrients and net tows). Most of these sections were also occupied in June 1998 and June 1999 as part of a redfish research cruise (CTD+ nutrients + net tows). In addition, the St. Lawrence section was occupied four times during the 1999 summer as part of ECOPAL (CTD + chlorophyll), and the Cabot Strait section was occupied during the August 1998 and 1999 groundfish surveys (CTD).

The basic strategy is to look for opportunities to sample the different sections in the Gulf as often as possible. Our monitoring staff is ready to participate to this sampling as required.

Problems: Very rough weather in December 1999 reduced the amount of sampling done during the ice forecast cruise. The frequency of sampling at most sections in not sufficient to describe the seasonal cycle.

Table 1. Summary of Gaspé Current and Anticosti Gyre station occupations in 1998		
DATE	**VESSEL**	**CRUISE**
12-JAN-1998	Sir J. Franklin	AZMP
30-JAN-1998	Sir J. Franklin	AZMP
19-FEB-1998	P. Radisson	AZMP
05-MAR-1998	G. Pearkes	AZMP
02-JUN-1998	M.L. Black	Southern Gulf zooplankton
18-JUN-1998	M.L. Black	Redfish research project
28-JUN-1998	M.L. Black	Toxic algae research project
15-SEP-1998	M.L. Black	Zooplankton biomass survey in Estuary
04-NOV-1998	Hudson	Ice forecast cruise

Table 2. Summary of Gaspé Current and Anticosti Gyre station occupations in 1999		
DATE	**VESSEL**	**CRUISE**
13-JAN-1999	M.L. Black	99-001, AZMP
29-JAN-1999	M.L. Black	99-001, AZMP
12-FEB-1999	M.L. Black	99-001, AZMP
04-MAR-1999	M.L. Black	99-001, AZMP
05-MAY-1999	G.R. Pearkes	99-001, AZMP
11-MAY-1999	G.R. Pearkes	99-001, AZMP
18-MAY-1999	M.L. Black	99-001, AZMP
27-MAY-1999	M.L. Black	99-001, AZMP
04-JUN-1999	G.R. Pearkes	99-001, AZMP
12-JUN-1999	M.L. Black	99-014, ECOSYS
30-JUN-1999	M.L. Black	99-017, SEAWIFS
07-JUL-1999	M.L. Black	99-017, SEAWIFS
13-JUL-1999	M.L. Black	ÉCOPAL
27-JUL-1999	Tracy	ÉCOPAL
10-AUG-1999	M.L. Black	99-001, AZMP
26-AUG-1999	M.L. Black	99-042
12-SEP-1999	G.R. Pearkes	99-043, Zooplankton biomass in Estuary
29-SEP-1999	Tracy	99-001, AZMP
21-OCT-1999	Tracy	99-001, AZMP
09-NOV-1999	Tracy	99-001, AZMP
02-DEC-1999	M.L. Black	99-001, AZMP
09-DEC-1999	Hudson	99-053, Ice forecast cruise

Databases: Although significant progress has been made, a major effort is still required at IML to develop a transparent process for handling the different monitoring data collected through different programs. We are planning to use the "St. Lawrence Observatory" to diffuse and show value added monitoring products, without duplicating MEDS' work. A very good partnership has been established with MEDS.

Personnel: In 1998, the three rejuvenation FTEs were used to cover AZMP dedicated staff. In 1999-2000, we had to give up one FTE to cover a shortage on the fisheries side at the request of the Science Director. This FTE should, however, be returned to the AZMP for fiscal year 2000-2001

Budget Summary

The table below is a budget summary for the first 2 years of the program. These resources include the AZMP as well as the A-base funding that was use for monitoring in the Laurentian region. Salaries / FTEs therefore include AZMP associated programs as well as ship time (e.g, Ice-Forecast, or spring helicopter cruises). All the overtime was covered by A-base funding. The 1999-2000 entries also include estimates and contracts that are not yet completed.

Laurentian region: AZMP+ A-Base Funding	**1998-99 $K**	**1999-2000 $K**
O&M		
Field Sampling (including supplies)	58.0	42.0
Data Processing and analysis	10.0	24.0
Sample processing (phyto- & zooplankton + nutrients)	24.0	36.0
Meetings/travel	12.0	15.0
Remote Sensing	20.0	15.6
Capital	10.0	25.0
Overtime	52.8	59.4
Total O&M	**186.8**	**217.0**
Salary/FTE's	**449.0 / 8.4**	**376.0 / 7.1**
Total (Direct AZMP funding)	**636.6**	**593.0**

Other Monitoring programs	**1998-99 $K**	**1999-2000 $K**
Ice Forecast	10.0	10.0
LTTMP	8.0	7.0
Toxic algae	28.0	25.0
Biomass Zooplankton	20.0	18.0
Remote sensing	15.0	15.0
Total	**81.0**	**75.0**

Ship time (dedicated to AZMP)	**445.0**	**481.0**
Total monitoring related funding	**1081.6**	**1074.0**
AZMP Allocation	**265.0**	**265.0**

ANNEX IV

MARITIMES REGION: SUMMARY OF ZONAL MONITORING 1998-2000

Oceanographic Sampling

Fixed Stations

Prince 5, located off Grand Manan Island, near the mouth of Passamaquoddy Bay, run by St. Andrews Biological Station, sampling every 2 weeks, CTD, nutrients, chlorophyll, salinity, dissolved oxygen, net tows (200 μ& 76 μ).

Station 2, off Halifax, originally part of Halifax Section, run by BIO, sampling nominally every 2 weeks, CTD, nutrients, chlorophyll, salinity, dissolved oxygen, net tows (200 μ & 76 μ).

Shediac Valley, southern Gulf of St. Lawrence off Shippegan, run by Gulf Fisheries Centre, sampling nominally every 2 weeks, April to November, CTD, nutrients, chlorophyll, salinity, dissolved oxygen, net tows (200 μ & 76 μ).

Problems: Securing ship time for Sta. 2 and the Shediac Valley Station has been a problem particularly during winter months. The major factor has been weather, especially in the Gulf where the dedicated scientific survey vessel is taken out of the water in winter. Another factor is the lower priority placed on the occupation of stations compared with other vessel activities such as search and rescue since the designated primary vessel for Sta. 2 is a Coast Guard SAR boat. Similarly, when using vessels of opportunity, the lack of proper equipment to carry out survey work can present further difficulties.

A summary of the fixed station occupations is given in Table 1 below:

Table 1. Summary of fixed station occupations to date for 1999

STA. 2			SHEDIAC			PRINCE 5		
DATE	VESSEL	CRUISE	DATE	VESSEL	CRUISE	DATE	VESSEL	CRUISE
JAN 13	SAMBRO	99666	APR.30	OPILIO	99668	JAN.18	PANDALUS	99669
JAN 30	SAMBRO	99666	MAY 21	OPILIO	99668	JAN.28	PANDALUS	99669
FEB 11	PARIZEAU	98078	JUN 9	OPILIO	99668	FEB.12	PANDALUS	99669
FEB 16	PARIZEAU	98078	JUL 1	OPILIO	99668	MAR.19	PANDALUS	99669
MAR 31	CYGNUS	99079	AUG 2	OPILIO	99668	APR.16	PANDALUS	99669
APR. 09	HUDSON	99003	AUG 23	OPILIO	99668	APR.30	PANDALUS	99669
APR. 18	HUDSON	99003	SEP 12	NEEDLER	99041	MAY 31	PANDALUS	99669
MAY 05	WESTON	99666	OCT 13	OPILIO	99668	JUN.28	PANDALUS	99669
MAY 19	WESTON	99666	OCT 30	OPILIO	99668	JUL.30	PANDALUS	99669
JUN 10	SAMBRO	99666	NOV 16	OPILIO	99668	AUG.13	PANDALUS	99669
JUN 10	HUDSON	99018				AUG.30	PANDALUS	99669
JUN 21	HUDSON	99018				OCT.12	PANDALUS	99669
JUN 28	HUDSON	99022				OCT.29	PANDALUS	99669
JUL 05	NEEDLER	99025				NOV.17	PANDALUS	99669
JUL 16	NEEDLER	99025						
JUL 31	NEEDLER	99029						
AUG 13	SAMBRO	99666						
AUG 27	SAMBRO	99666						
SEPT 10	SAMBRO-FRC	99666						
SEPT 29	PARIZEAU	99028						
OCT 23	HUDSON	99054						
NOV 5	HUDSON	99054						
NOV 12	HUDSON	99054						
NOV24	SAMBRO	99666						

Sections
Halifax Section – occupied on spring and fall cruises in 1998 and 1999. In addition, the **Cabot Strait, Louisbourg and Cape Sable sections** were occupied though they are not part of the long-term monitoring program. We shall try to occupy these sections as long as possible. CTD, dissolved oxygen, nutrients and net tow data were collected on the sections.

Hydrographic and nutrient data (surface and bottom samples) were collected on the winter Georges Bank and eastern Scotian Shelf , summer (July) Scotian Shelf - Bay of Fundy, and September southern Gulf of St. Lawrence groundfish surveys. In 1999, AZMP personnel participated on the July and September survey cruises and will do so for the winter surveys in 2000. Net tows were collected on 32 stations of the July and 19 stations of the September surveys in 1999.

The WOCE cruises to the Labrador Sea ran Halifax Sections in both years in June, providing data to complement the spring and fall sections.

Problems: IGOSS messages failed to get on the GTS for a number of reasons. These problems are being addressed by MEDS and BIO. A backlog of unsubmitted CTD data was uncovered and rectified. Steps are being taken to ensure data reach MEDS in a timely fashion. Nutrient and biological data are being held in a variety of formats that add extra work when they are merged with other data types. This is also under review.

Databases
Processing the SeaWifs data and producing biweekly images continues. Development of a 9 km resolution database for internet access and general queries is planned for early 2000. The MCSST database has been updated to November 1999, thus 18 years of sea surface temperatures are available online for data recoveries. The monthly image files for the Gulf, Newfoundland Shelf, Scotian Shelf, and WOCE region have been updated.

The CPR database has been updated to the end of 1998. Development is continuing on the BIOCHEM database with significant progress expected in 2000.

Personnel
Two biological oceanographer positions were filled with the hiring of J. Spry (sea-going oceanographer) and H. Maass (Remote sensing specialist) to full time continuing positions. A term oceanographic technician, K. Pauley, was hired and is based at the Gulf Fisheries Centre in Moncton. Two contractors have been hired to assist with the sea-going biological program, P. MacPherson, and the data analysis, V. Soukhovtsev.

Processing Archived Biological Data
Biological Oceanography Section continues to assemble, quality control and archive chlorophyll data collected in the region over the past 25 years. Combined with data residing in the MESD nutrient database, some 23,000 chlorophyll data records have been recovered. These data have been used to construct seasonal climatologies of chlorophyll distribution on the Scotian Shelf with an emphasis on vertical structure.

Phytoplankton samples are to be processed at the Gulf Fisheries Centre including Scotian Shelf, April 1999 (43 samples), the Shediac Valley (10), the Gulf of St. Lawrence Groundfish survey (33) and some intercomparison samples from IML (6).

Budget Summary

After converting unused salary dollars to O&M funds, the allotments for the program were $190.2K in fiscal 1998-1999 and $157.9K in fiscal 1999-2000.

Salary funds, available because of delays in filling permanent positions, were used for term positions in order to begin the sampling program, analyze samples and further the development of required databases.

In 1998-1999, $35.6K O&M was transferred to the RD Science to address shortfalls, leaving an O&M balance of $154.6K. A further $39.8K salary was used to address a Science salary shortfall.

In 1999-2000, sampling of opportunity was conducted on selected fish surveys. We were fortunate to have unused salary dollars to fund the overtime incurred on these cruises. Next year, because monitoring personnel are already on staff, we will not have these extra funds to cover the required overtime expense.

The table below is a budget summary for the first 2 years of the program. The 1999-2000 entries include estimates and contracts that are not yet completed.

Maritimes region: AZMP+ A-Base Funding	**1998-99 $K**	**1999-2000 $K**
O&M:		
Biol. Database (BIOCHEM)	50.0	5.0
Data Processing	10.2	36.2
Sampling equipment	34.8	6.9
Meeting (travel)	15.6	12.5
Sample analysis (Zooplankton & nutrients)	18.0	34.5
Field sampling	0.8	22.8
Supplies	6.7	10.0
Capital	19.2	22.0
Overtime	20.0	35.2
Total O&M	**175.3**	**185.1**
CPR	**80.0**	**80.0**
Salary/FTE's	**229.0 / 4.3**	**269.0 / 6.1**
Total (Direct AZMP funding)	**484.3**	**534.1**

Other Monitoring programs	**1998-99 $K**	**1999-2000 $K**
Fish Surveys	20.0	20.0
LTTMP	14.0	14.0
Toxic algae	10.0	10.0
Supp. Environmental data	10.0	10.0
Remote sensing	15.0	15.0
Total	**69.0**	**69.0**

Ship Time (dedicated to AZMP)	**419.0**	**594.0**
Total monitoring related funding	**972.3**	**1197.1**
AZMP Allocation	**345.0**	**345.0**

ANNEX V

MEDS : SUMMARY OF ZONAL MONITORING ACTIVITY 1998-2000

Activities 1998-99

MEDS played a key role in coordinating the data management activities for the AZMP as well as in the implementation of a number of its components. These are:

Data Management Plan. A data management plan has been developed by the Data Management sub-committee chaired by the Director of MEDS. This plan will provide the basic framework for handling the data collected by and of use to the AZMP. This work was accomplished through conference calls and e-mails and with active participation of all members of the sub-committee members and Bob Keeley at MEDS. Work will continue on the plan to fill out the details and to align it with new requirements as necessary

Database Model. A biological oceanographic database model was developed through collaboration among the AZ data management group, several staff at MEDS and the national carbon data Archive WG and with support from the Maritimes Informatics staff. A preparatory discussion meeting was held at BIO followed by a national workshop at Ottawa. The combined team put in considerable effort to fine-tune the model. MEDS provided partial support to the travel and for the workshop.

Under the present cost-recovery system for Informatics, their support will have financial implications. It is expected that partial funding for these will be allocated by AZMP.

Expertise. The need for ORACLE expertise was recognized right from start. Funds from the program were used to provide partial support for training for Laure Devine, Graham Glenn and Estelle Couture.

In 1999/2000, additional training (and/or paid Informaics support) may be required as we start building various modules of the database in all regions.

Database Platform. To implement the biological database with a node at MEDS, it was necessary to purchase a UNIX workstation at MEDS and load it with ORACLE. Purchase of the platform was partially funded by AZMP.

Data Migration. A large volume of CTD and nutrients data from Canadian waters was obtained from NODC, USA. Migration of the CTD data into MEDS archive and the nutrient data into BIO archive was carried out with partial support of the AZMP funds.

For 1999/2000, support will be required to migrate data into the structure and to build the necessary front end for access and manipulation of data.

Data Inventory. A web-based national bilingual inventory of ocean science data is being developed at MEDS with input from the regional representatives. The inventory will provide tools for the AZMP team and others. This work will be continued in the next fiscal year.

AZMP WWW. A key component of the data management infrastructure for AZMP is the web. The web structure is being sketched out and tested with STN27 data as a mock up how we intend to handle data from the fixed stations.

MEDS was allocated 20K in 1998/99 to assist in the activities associated with AZOMP. The funds were supplemented with Ocean Climate funds and A-base salary dollars. Similar level of funding will be needed at MEDS for the next year.

Progress Report 1999-2000

The Data Management Subcommittee had established four main objectives for 1999. These were (see the AZMP Data Management Plan, Feb. 1999):

- Complete the development of the biological database and migrate at least three major data sets (Sameoto's Oracle database, Strain's nutrients data set, and Platt's plankton data set. The three will constitute a significant portion of the biology data in the Maritimes Region that are relevant to AZMP.
- Complete the web-based query system to help users identify data collections of interest.
- Implementation of the AZMP WWW site for data, products, and documents.
- Co-ordinate and implement standard procedures for quality control, processing, archiving, and dissemination of the AZMP's data, and make the data available in a timely manner as required.

Biology Database Development

The Maritimes Region took the responsibility for implementing the basic design of the biology database in coordination with the Regional Informatics personnel. After the first phase of the implementation by BIO, a 2-day workshop was held at BIO to discuss and review the progress and to develop future plans (see Report of BIOCHEM Workshop, September 23-24). The attendees of the workshop are given below:

Lenore Bajona – ASD/BIO
Robert Benjamin – MESD/BIO
Bob Branton – MFD/BIO
Angelo Cortello– ASD/BIO
Estelle Couture MEDS
Laure Devine - IML
Graham Glenn - MEDS
Doug Gregory – OSD/BIO
Anthony Isenor –OSD/BIO
Darlene Jillet - NWAFC
Mary Kennedy-OSD/BIO
Stephen Romaine -IOS
Dave Senciall - NWAFC
Peter Strain – MESD/BIO

At this workshop, several action items were identified along with the time line and person(s) responsible for each.

Web-based query system

The DM Subcommittee recognized the fact that in a system of distributed databases, it will be very easy to loose the links to some of the key data sets. Consequently, it was decided to maintain an inventory of data at MEDS with a web-based query system to search for either the data or the location of the data in DFO. This system was implemented and preliminary tests were done. MEDS will continue the development of the system and will ensure the maintenance of the appropriate links.

AZMP WWW site

The development of the AZMP web site has progressed well, as can be seen from the demonstration that will follow. The site has documents related to the AZMP, data from the fixed stations both in real-time and up to 1 year from present. Time, depth sections of temperature, salinity, dissolved oxygen and fluorescence are presented. However, certain decisions have to be made as to the contents of the website and access to the data.

Coordination and dataflow

AZMP has an excellent data management team working in collaboration not only with each other but also with regions outside the Atlantic Zone. The net result is that the group was able to make significant progress and obtain the buy-in from each region right at the start.

An interim data exchange from IML to MEDS has been set up for Gulf fixed stations. This will be replaced as exchange formats are agreed and implemented. All CTD data from the NE Gulf station from IML are moved to MEDS and are currently being processed. All nutrient data from the two fixed stations in the Gulf have also been transferred to MEDS database.

A new exchange format for real-time data is nearly finalized. There are only a few minor details to agree to. Software to handle this is in place at MEDS. An exchange protocol for nutrients, chlorophyll and oxygen (Winkler) data with NWAFC is being finalized.

Staffing and funding

Recognizing the need for additional ORACLE expertise, MEDS has recently hired Claude Guay, who was responsible for the NCIS at IML. Claude will provide the necessary support to Estelle to move the data base development to the next levels.

In addition to the resources allocated by the AZMP, the DM Subcommittee was given 48K to assist with the model implementation nationally. Up to now, this fund was used to continue with the task at BIO and to migrate UBC biology data to DFO through IOS. Support was also provided to enhance the national nutrient database.

		1998	1999
Allocation			
ZMP		$20K	$20K
Leveraged resources	Sal (.5 FTE)	$25K	$25K
	OCP*	$20K	$30K
	MEDS A-Base	$10K	$10K
	TOTAL	**$75K**	**$85K**
Expenditures	Sal (.5 FTE)	$25K	$25K
	Transfer to Regions**	$35K	$40K
	students at MEDS	$10K	$10K
	Computer supplies and software	$5K	$10K
	TOTAL	**$75K**	**$85K**

* these funds were for data management activities: data archeology in 98 and Biological data base development in 99
** transfers were made to bring old data to database and to build BIOCHEM database.