

The pages in this PDF contain a single section extracted from the

## *ICES Zooplankton Status Report 2010/2011*

The full electronic document is available online at:

<http://WGZE.net>

Full-color printed copies are available from:

<http://ICES.dk>

O'Brien, T. D., Wiebe, P.H., and Falkenbaug, T. (Eds). 2013.  
 ICES Zooplankton Status Report 2010/2011.  
 ICES Cooperative Research Report No. 318. 208 pp.

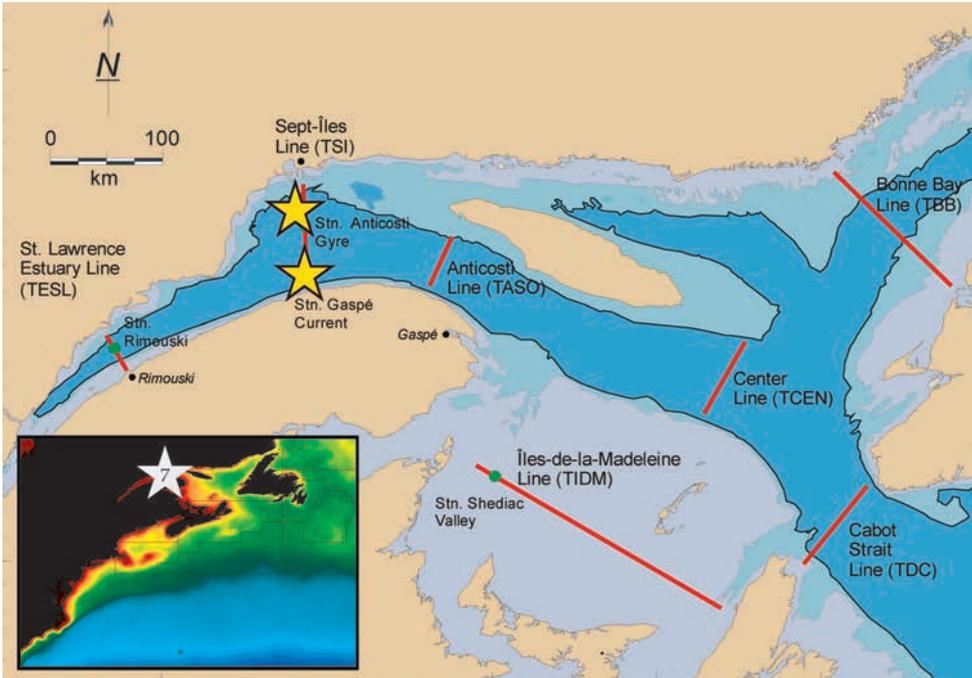


The time-series analyses and figures used in this report were created using COPEPODITE:

<http://www.st.nmfs.noaa.gov/copepodite>

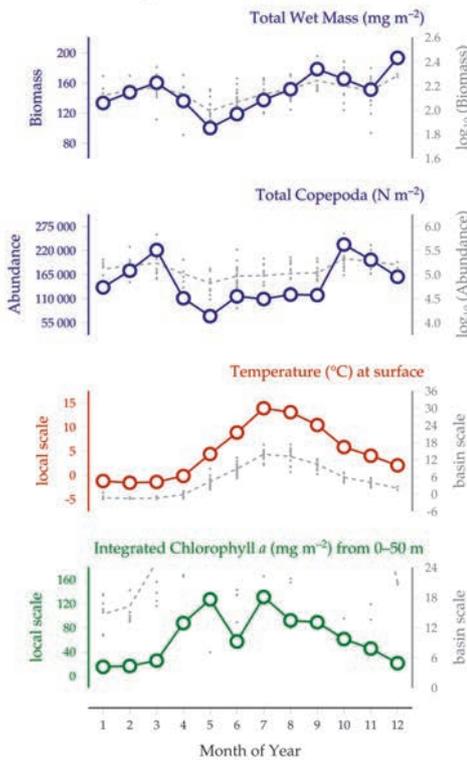
### 3.4 Anticosti Gyre and Gaspé Current (Site 7)

*Michel Harvey and Stéphane Plourde*

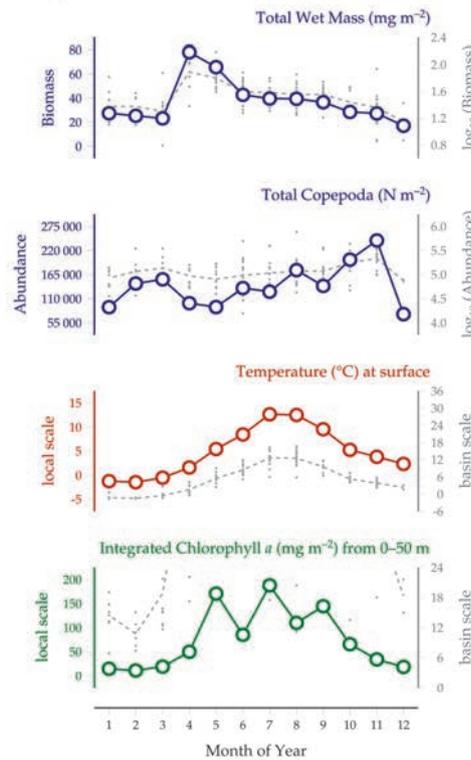


**Figure 3.4.1**  
Locations of the Anticosti Gyre (upper star) and Gaspé Current (lower star) monitoring areas (Site 7), and their corresponding seasonal summary plots (see Section 2.2.1).

#### Anticosti Gyre



#### Gaspé Current



The Atlantic Zone Monitoring Programme (AZMP) was implemented in 1998 to collect and analyse the biological, chemical, and physical field data necessary to (i) characterize and understand the causes of oceanic variability at the seasonal, interannual, and decadal scales; (ii) provide multidisciplinary datasets that can be used to establish relationships among the biological, chemical, and physical variables; and (iii) provide adequate data to support the sound development of ocean activities. The key element of AZMP sampling strategy is oceanographic sampling at fixed stations and along sections. Fixed stations are visited approximately every 2 weeks, conditions permitting, and sections are sampled in June and November. Zooplankton are sampled from the bottom to the surface with a ring-net (75 cm diameter, 200  $\mu\text{m}$  mesh). CTD profiles are recorded, and samples for phytoplankton, nutrients, and extracted chlorophyll are collected using Niskin bottles at fixed depths. Samples are combined to give an integrated sample.

### Seasonal and interannual trends (Figure 3.4.2)

The data presented in this summary are from two sampling stations in the northwest Gulf of St Lawrence (GSL): the Anticosti Gyre (AG, depth: 350 m) and the Gaspé Current (GC, depth: 185 m), which together comprise Site 7 (Figure 3.4.1). The GSL is a coastal marine environment with a particularly high zooplankton biomass, relative to other coastal areas, which is dominated by *Calanus* species (de Lafontaine *et al.*, 1991). Zooplankton sampled at the shallow GC site is generally dominated by surface dwelling taxa and 'active' development stages of *Calanus* species whereas deep-dwelling dormant stages of *C. finmarchicus* and *C. hyperboreus* are well represented in samples collected at AG (Plourde *et al.* 2001, 2002, 2003). Zooplankton biomass (total wet mass, Figure 3.4.2) has been generally decreasing at both sites since 2003, whereas copepod abundance at both sites has been increasing since 2000, suggesting a potential trend in zooplankton size structure. Hierarchical community analysis revealed that, numerically, copepods continued to dominate the zooplankton year-round at both fixed stations with no apparent change in copepod community structure was found at either station (Harvey and Devine, 2009).

Zooplankton abundance and biomass do not follow the same seasonal cycle or interannual patterns as chlorophyll. For example, the zooplankton minimum observed at AG in 2001 corresponded to a chlorophyll *a* peak, whereas the zooplankton peak at GC in 2003 corresponded to a chlorophyll *a* minimum. This absence of correlation between zooplankton and algal biomass has been observed in the GSL (de Lafontaine *et al.*, 1991; Roy *et al.*, 2000). The complex estuarine circulation pattern observed at GC and AG is likely to generate this apparent mismatch between surface conditions (chlorophyll *a*) and vertically migrating organisms (zooplankton) at the weekly scale (Saucier *et al.*, 2003; Maps *et al.*, 2011).

Annual cycles of sea surface temperature at both sites are similar, with values below 0°C in winter and peaks above 14°C during summer. Long-term temperatures in the region reveal that temperatures are currently at the high end of an approximately 50-year multidecadal trend. Temperature has been near, or even above, the 100-year maximum (Figure 3.4.3, red dashed line) since 2005. The exact effects of these high temperatures are not fully understood, although total copepod abundance at both regions is currently increasing with increasing temperature at AG and GC.

A detailed ecosystem status report on the state of phytoplankton and zooplankton at these sites is prepared every year. This report is available online at: <http://www.meds-sdmm.dfo-mpo.gc.ca/csas-sccs/applications/publications/index-eng.asp>.

### Anticosti Gyre, western Gulf of St. Lawrence

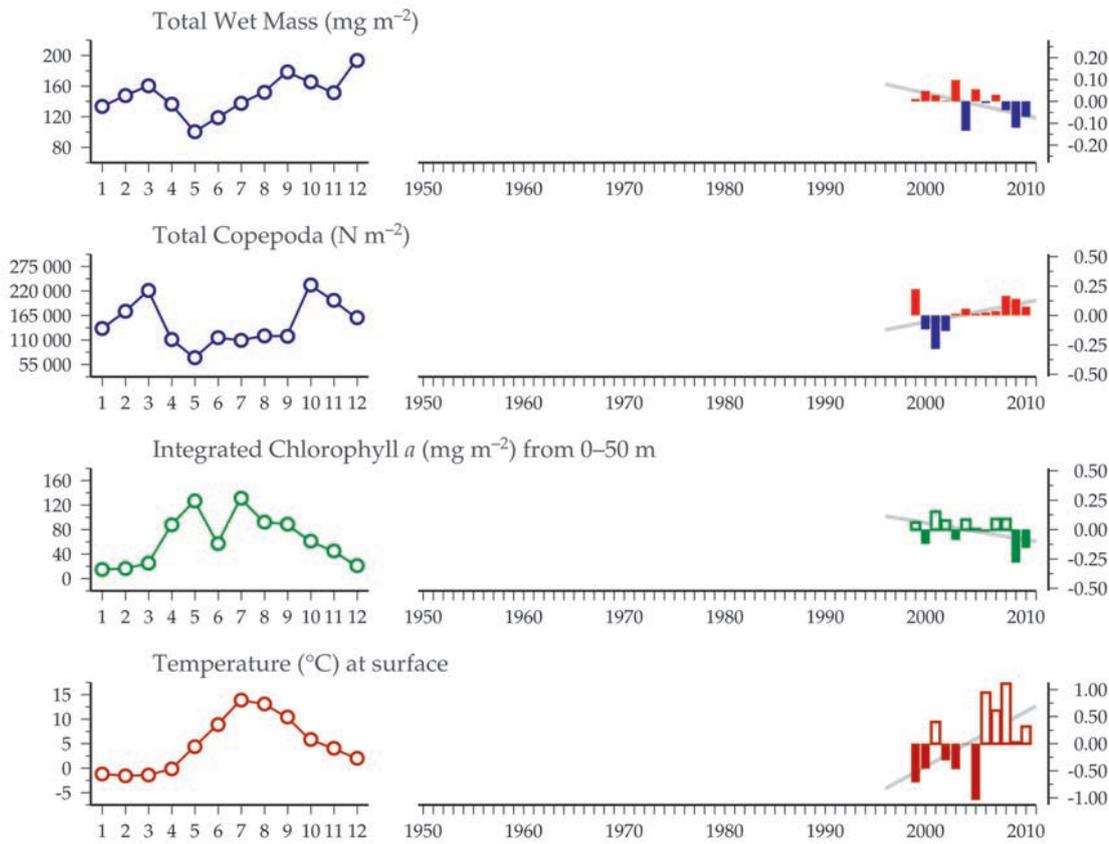


Figure 3.4.2  
Multiple-variable comparison plot (see Section 2.2.2) showing the seasonal and interannual properties of select cosampled variables at the Anticosti Gyre and Gaspé Current monitoring areas.

Additional variables are available online at: <http://WGZE.net/time-series>.

### 50-year trends in the Sargasso Sea region

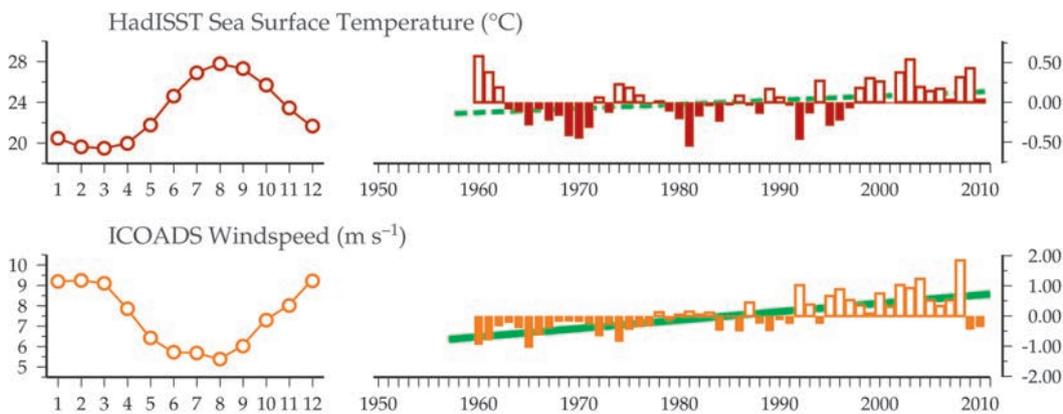


Figure 3.4.3  
Regional overview plot (see Section 2.2.3) showing long-term sea surface temperatures and wind speeds in the general region surrounding the Anticosti Gyre and Gaspé Current monitoring areas.

### 100-year trends in the Sargasso Sea region

