

FIRST CHARACTERIZATION OF THE PLANKTONIC COMMUNITY IN THE NORTHERN SECTOR OF THE JOINT REGIME AREA JAMAICA – COLOMBIA

José Manuel Gutiérrez-Salcedo¹, Angélica Cabarcas-Mier² and Nancy Suárez-Mozo³

1 Instituto de Investigaciones Marinas y Costeras (Invemar), Museo de Historia Natural Marina de Colombia (MHNMC), Playa Salguero, Santa Marta, Colombia. jose.gutierrez@invemar.org.co

2 Cartagena, Colombia. angelicacabarcas@gmail.com.

3 Barranquilla, Colombia. nancy-yolimar@hotmail.com

ABSTRACT

The Joint Regime Area Jamaica-Colombia (JRA) is a sector of economic importance for Colombia but its biodiversity is unknown due to the difficult access. Therefore, the Institute of Marine and Coastal Research - Invemar in agreement with the National Hydrocarbon Agency - ANH, made an expedition in 2011 to obtain a first approximation to the diversity of the JRA. Within the groups studied was the plankton, which was collected around landforms at 21 sampling stations in the northern sector of the JRA, with special plankton nets of 20 µm pore size mesh for phytoplankton and 200 µm for zooplankton. Organisms were identified to the lowest possible taxonomic category and an ecological analysis was performed using descriptive statistics, univariate and multivariate. 183 morphospecies of phytoplankton and 57 taxa (family and phylum) of zooplankton were identified, generating three geographically differentiated associations. The phyto and zooplankton found in the JRA is part of the plankton community typical of oligotrophic tropical oceanic waters and local differences could be due to ocean dynamics between the Caribbean Current Surface and landforms of the of San Andrés and JRA archipelago .

KEY WORDS: Phytoplankton, Zooplankton, Joint Regime Area.

RESUMEN

Primera caracterización de la comunidad planctónica del sector norte del Área de Régimen Común Jamaica-Colombia. El Área de Régimen Común Jamaica-Colombia (ARC) es un sector de importancia económica para el país pero de difícil acceso, desconociéndose en la actualidad su biodiversidad. Por ello el Instituto de Investigaciones Marinas y Costeras, en convenio con la Agencia Nacional de Hidrocarburos, realizó una expedición en 2011 para obtener una primera aproximación a la diversidad del ARC. Dentro de los grupos estudiados estuvo el plancton, por lo que se requirió recolectar muestras en 21 estaciones dentro del sector norte del ARC, alrededor de las geoformas, con redes especializadas de 20 µm de poro de malla para fitoplancton y 200 µm para zooplancton. Los organismos fueron identificados a la categoría taxonómica más baja posible y se realizó un análisis ecológico a partir de estadísticos descriptivos, univariados y multivariados. Se identificaron 183 morfoespecies de fitoplancton y 57 grupos taxonómicos (familia y phylum) de zooplancton, generándose tres asociaciones

diferenciables geográficamente. El fito y zooplancton encontrados en el ARC hace parte de la comunidad planctónica de aguas típicas tropicales oceánicas oligotróficas (ATTOO) y las diferencias locales se pudieron deber a la dinámica oceánica entre la Corriente Superficial del Caribe y a las geoformas del archipiélago de San Andrés y del ARC.

PALABRAS CLAVES: Fitoplancton, Zooplancton, Área de Régimen Común.

INTRODUCTION

One of the main biological components of the pelagic medium is plankton or organisms that can not maintain their spatial distribution, independently of the movement of water masses (Parsons *et al.*, 1984). Among them are several autotrophic and unicellular organisms such as diatoms, dinoflagellates, and blue-green algae, that make part of phytoplankton (Dawes, 1986; Tait, 1987) plus individuals that are part of all the phyla of marine invertebrates, and fish eggs and larvae, as permanent or partial residents of the community, that make part of zooplankton (Parsons *et al.*, 1984). Those groups are important because they control the flow of energy of the marine environment (Raymont, 1983; Bathman *et al.*, 2001), positively intervene, at a macro scale, in climatic change (Franco-Herrera *et al.*, 2006), in the distribution of many species (Mujica, 2006), and are good indicators of the ecological state of the system (Daly and Smith, 1993; Pinel-Alloul, 1995).

The planktonic community of the Colombian Caribbean Sea (CCS) is characterized by a group of stable and mature assemblies, typical of a tropical oligotrophic system (Gutiérrez-Salcedo, 2011). Those assemblies change depending on their location, showing high abundance and low richness in coastal locations (Bernal, 2000). This pattern of abundance and richness is inverted as they move further away from the coast and the oceanic region shows the least abundant and richest assemblies (Lozano-Duque *et al.*, 2010). Ecologically, the planktonic community of the CCS presents low productive in comparison with other regions (Franco-Herrera, 2006) and is mainly dominated by dinoflagellates, diatoms, and cyanobacteria (phytoplankton) (Franco-Herrera *et al.*, 2006); and copepods, larvaceans and chaetognaths (zooplankton) (Gutiérrez-Salcedo, 2011).

Among the studies performed in the CCS, 190 species from 69 phytoplankton genera have been described from the insular region (Herrera, 1985; Garay *et al.*, 1988; Téllez *et al.*, 1988; Campos-González, 2007; Vargas-Castellanos, 2008) and 235 zooplankton species, of which 150 were holoplankton (Giraldo and Villalobos, 1983; Mulford, 1983; Márquez and Herrera, 1986; Martínez-Barragán, 2008; Martínez-Barragán *et al.*, 2008) and 85 fish larvae (Godoy and Escobar, 1983; Lara and Cabra, 1984). These studies suggest that the Archipelago's planktonic

community, with relation to those found in the coastal and oceanic regions of the Colombian Caribbean, present a lesser productivity; it is dominated by cyanobacteria and dinoflagellates at the phytoplankton level, while at the zooplankton level the same groups are maintained; and the trophic tendency is closer to a herbivorous system.

However, none of the studies were performed in the Joint Regime Area (JRA) Jamaica-Colombia, an area of current and future high importance for the country, politically as well as economically and environmentally (Invemar, 2012). Therefore, an interinstitutional cooperation agreement between the National Hydrocarbon Agency (ANH) and the Marine Research Institute (Invemar) was reached in order to carry out the base environmental line for the JRA as contribution to sustainable exploitation of the shared marine resources (Agreement No. 16 from 2010). To accomplish this agreement the planktonic community at the JRA was preliminary evaluated in order to generate the information needed to produce management guidelines for the JRA so that Colombia and Jamaica may adequately use the existing resources.

STUDY AREA

The JRA was created through the Sanin-Robertson treaty on November 12 of 1993, between the republics of Jamaica and Colombia to manage, do research, preserve, and exploit its maritime areas rationally and jointly. The region is a polygon with an approximate area of 15000 km² and a depth of more than 1.5 km (Invemar, 2012) (Figure 1). Geographically it is located northeast of San Andrés, Providencia and Santa Catalina Archipelago, within the lower Nicaraguan Ridge (Case *et al.*, 1984). To the north it evidences a variety of geomorphological features such as the Serranilla bank, the Alicia and Nuevo shoals and the Macondo guyot (Geister and Díaz, 2002). A more detailed description of the study area is available in Invemar (2012).

Three water masses have been described within the area up to 1000 m depth (Wüst, 1964), of which the most superficial is the Caribbean Superficial Water - of the Caribbean – CSW found at the upper 50 to 75 m (González, 1987). This water mass flows to the northeast due to the Caribbean Superficial Current. - CSC. However, thanks to the bottom configuration several eddys are generated which are more prominent during July and October, generating more dynamics and thus a lesser oceanographic homogeneity at lesser scales (Andrade *et al.*, 1996).

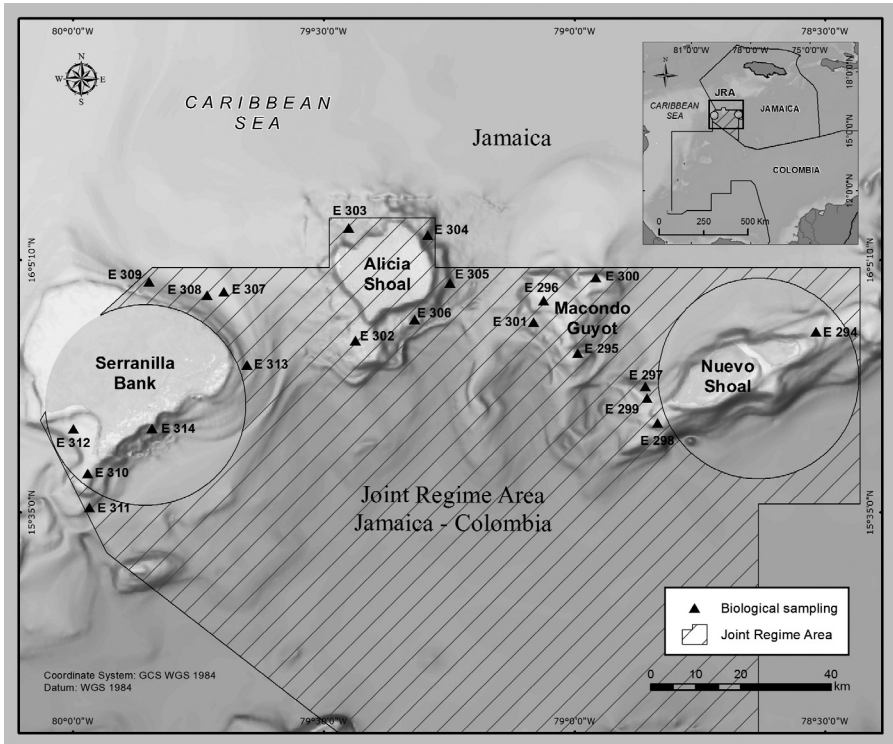


Figure 1. Joint Regime Area (JRC) Jamaica-Colombia (Labsis-Invemar, 2014)

MATERIALS AND METHODS

The expedition took place between October the 11th and November the 9th 2011, on board of the multi-purpose towboat Don Rodrigo B. The samples were got at 21 stations located around the four main geomorphological traits of the CRA (*i.e.* Alicia and Nuevo Shoals, Macondo Guyot, and Serranilla Bank) (Figure 1). To achieve this, plankton nets were used with lengths of 2.2 m, 60 cm opening, and 20 μm mesh size of for phytoplankton and 200 μm for zooplankton. A previously calibrated flowmeter was used for the zooplankton net using revolutions to calculate speeds. In both cases, the nets were initially lowered to a depth of approximately 50 m, and subsequently dragged horizontally at an average speed of 1 m/s for 10 min, and later raised on board. The organisms that were trapped in the collector were transferred to 500 mL plastic containers, adding as a formaldehyde solution neutralized with sodium tetraborate as preservative, resulting in a final preservative-seawater concentration of 5%. The samples were stored in dry places while they were taken to the lab for their posterior observation and identification.

Organisms in each sample were identified and accounted to the lowest possible taxonomical category with the help of an inverted microscope and a stereoscope, and following the morphological diagnostic characteristics for each of them (phytoplankton: Boyer, 1927; Cupp, 1943; Taylor, 1976; Balech, 1988; Round, 1990; Hasle and Syvertsen, 1997; Steidinger and Tangen, 1997; Soler *et al.*, 2003. Zooplankton: Alvarino, 1963; Newell and Newell, 1963; Boltovskoy, 1981; Campos and Suárez, 1994; Conway *et al.*, 2003; Boxshall and Halsey, 2004). Two aliquots of two millimeters per sample were used, counting 30 random fields in a Sedwigck-Rafter chamber for phytoplankton (McAlice, 1971). Fractions containing 1000 organisms per zooplankton sample were observed in Petri dishes. To achieve this, the samples were divided using a Folsom fractionator following Sell and Evans (1982) recommendations and those of De Oliveira-Diaz *et al.* (2010). The samples were divided a maximum of three times, verifying at least an eighth of the original sample. When performing the Relative Percent Difference statistic, no sample exceeded 19%, which leads to the conclusion that the divisions were properly done (Anonymous, 1994). Additionally, the protocols proposed by Harris *et al.* (2000) were used for the zooplankton samples to obtain biomass.

The information obtained from identification and accounting of the organisms in both groups was tabulated in independent matrixes, obtaining an organism percent abundance for phytoplankton and individuals per cubic meter for zooplankton. In both cases matrixes were constructed in relation to the sampled stations.

Before multivariate analysis and in order to verify the existence of anomalous data, a Z transformed table was done for each morphotype as well as for the stations. The results did not exceed the established threshold of three, so no data was eliminated (Morón, 2011). A multivariate non-parametric descriptive analysis of quantitative classification was done for both groups (Cluster), based on a triangular similitude matrix (Bray-Curtis index), in order to determine any association trend of the stations. Additionally, a one-way spatial association distribution (Anosim) was done for the zooplankton matrix to corroborate the association statistically. These routines were performed in the statistical software Primer-E v.5. (Clarke and Warwick, 1994).

In order to characterize and differentiate associations, ecological richness (S), Pielou uniformity (J'), and Shannon diversity (H') were found for both groups. Additionally, a beta richness (β_w) analysis was done for phytoplankton and an abundance (N), Simpson dominance (λ), Shannon Maximum diversity (H' max), and Hill diversity (NI) analyses were performed for zooplankton (Clarke and Warwick, 1994). As for the multivariate analyses, the indexes obtained for zooplankton were statistically compared using a Mann-Whitney test (non-parametric test), adding to the comparison the dry biomass and organic matter values obtained from the protocol proposed by Harris *et al.* (2000). Finally, ecological descriptions were made for each association, detailing each of the specificities as per flora and fauna composition of the phytoplankton and zooplankton.

RESULTS

One hundred and thirty-eight phytoplankton morpho-species were analyzed, with diatoms, dinoflagellates, and cyanobacteria as the most representative groups (Annex 1). While there were 57 taxonomical groups described for zooplankton (family and phylum), the most abundant were copepods (phylum Arthropoda), mainly within the Calanoida order representing 68% of total abundance, and larvaceans (phylum Chordata) (Annex 2).

The dendrograms allowed determining that the samples were grouped following a geographical pattern (Figure 2). Most stations of the Nuevo Shoal and Macondo Guyot were in Association I, while those of Alicia Shoal and Serranilla Bank were grouped in Association II. Association III only contained phytoplankton assembly and was composed by three stations of the Serranilla Bank. Lastly, for both planktonic groups, the independent station was the same and belonged to the Macondo Guyot.

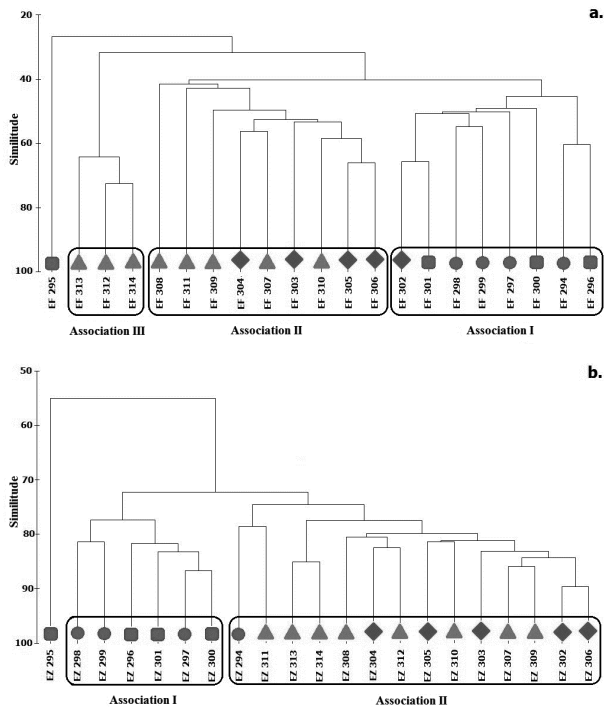


Figure 2. Grouping analysis between the sampling stations. a. Cluster based on percent abundance as per the Bray-Curtis similarity matrix of the phytoplankton component. b. Cluster based on density (ind/m³) as per the Bray-Curtis similarity matrix of the zooplankton component. Square: Nuevo shoal; Circle: Macondo Guyot; Rhombus: Alicia shoal; Triangle: Serranilla bank.

Associations made up for the zooplankton assembly presented structurally significant statistical differences (Global Anosim R: 0.699 [p = 0.1%]). All associations presented low predominance, high uniformity and diversity close to the maximum (Annex 3), finding statistical differences between the stations associated to an abundance dependency (N, H', J', λ , N1) (Table 1).

Table 1. Statistical description of ecological indices in each association formed with multivariate analysis for zooplankton (EZ). S: wealth; N: abundance (ind / m³); H: Shannon diversity; H' max: maximum diversity of Shannon; J: Pielou uniformity; λ : Prevalence of Simpson; N1: Diversity Hill; BS: Dry Biomass (mg * m⁻³); MO: Organic Matter (mg * m⁻³). Value - p: Mann-Whitney test. *: P value <0.05. so that there is no statistically significant difference.

| Group | Variables | Mean | SD | Min | Max | P |
|---------------|----------------|----------|--------|-----------------------|-------------------|------------|
| Association I | S | 27.17 | 3.06 | 23 (E 301) | 32 (E 296) | 0.93* |
| | N | 444.17 | 117.88 | 274.27 (E 296) | 610.01 (E 300) | 0.001 |
| | H' | 2.53 | 0.14 | 2.35 (E 301) | 2.66 (E 296, 298) | 0.02 |
| | H' máx | 3.30 | 0.11 | 3.14 (E 301) | 3.47 (E 296) | 0.93* |
| | J' | 0.77 | 0.04 | 0.72 (E 297) | 0.81 (E 298, 299) | 0.01 |
| | λ | 0.11 | 0.01 | 0.1 (E 296, 298, 299) | 0.13 (E 297, 301) | 0.01 |
| | N1 | 12.65 | 1.77 | 10.44 (E 301) | 14.31 (E 298) | 0.02 |
| | BS | 39.07 | 29.62 | 5.4 (E 300) | 88.67 (E 301) | 0.02 |
| | MO | 36.3 | 28.78 | 4.64 (E 300) | 84.51 (E 301) | 0.02 |
| | Association II | S | 27.00 | 3.21 | 21 (E 305) | 33 (E 294) |
| N | | 1.537.86 | 966.33 | 441.51 (E 294) | 4.131.76 (E 313) | |
| H' | | 2.31 | 0.18 | 1.96 (E 313) | 2.64 (E 294) | |
| H' máx | | 3.29 | 0.12 | 3.04 (E 305) | 3.5 (E 294) | |
| J' | | 0.70 | 0.05 | 0.59 (E 313) | 0.76 (E 305, 310) | |
| λ | | 0.15 | 0.03 | 0.1 (E 294) | 0.21 (E 313) | |
| N1 | | 10.00 | 1.48 | 7.11 (E 313) | 11.96 (E 294) | |
| BS | | 131.22 | 95.4 | 17.03 (E 294) | 351.41 (E 314) | |
| MO | | 125.24 | 93.38 | 14.61 (E 294) | 338.42 (E 314) | |

Association I was characterized because dinoflagellates were the phytoplankton group with the highest number of morphospecies and most abundant, in terms of percentage (41%), cyanobacteria (Figure 3a), with *Oscillatoria* and *Richelia* as the most representative genera (Annex 1). As far as the zooplankton assembly, the phylum Arthropoda contained the largest number of morphotypes and the highest abundance, mainly of the order Calanoida, with 68 % of the total association (Figure 3b). In terms of families, Corycaeidae, Oncaeidae (copepods), Oikopleuridae (larvaceans), and Sagittidae (chaetognaths), and crustacean larvae were the most abundant, with over 15 ind/m³ (Annex 2).

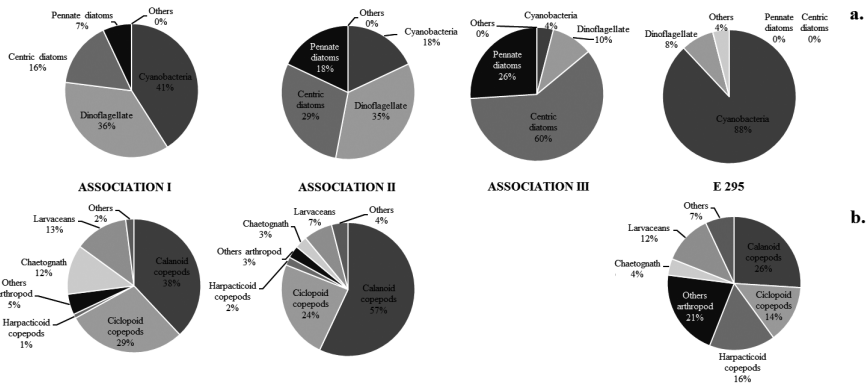


Figure 3. Percent representation of the dominant taxonomical groups by association. a. Phytoplankton assembly; b. Zooplankton assembly.

Association II was characterized by a dominance in diversity and abundance of diatoms, close to 50% of the total association, followed closely by dinoflagellates ($\approx 37\%$) (Figure 3a). While in the zooplankton assembly, calanoid copepods from the Paracalanidae, Calanidae, Calusocalanidae, and Acartiidae families were the most representative, although the most abundant were also representatives of the polychaetes Iospidae and Lopadorhynchidae, amphipod Hyperiididae and Oxycephalidae, and other copepods such as Toranidae. In this association, the most representative juveniles were echinoderm and fish larvae with over 50 ind/m³.

Association III was characterized for presenting a dominance in richness and percent abundance of diatoms in the phytoplankton assembly, mainly of the central ones ($\approx 50\%$ representation) (Figure 3a), decreasing in abundance but not in richness of dinoflagellates, and resulting in low abundance and richness of cyanobacteria. Lastly, station E 295 was characterized because cyanobacteria did not have the greatest percentage abundance while it shared richness representation with dinoflagellates (Figure 3a). Diatoms were barely present. On the other hand, the zooplankton assembly was represented by harpacticoid copepods of the family Miraciidae and among the juveniles (juvenile holoplankton and meroplankton) copepodites and nauplii, with more than 90% of the total study (Figure 3b).

DISCUSSION

The plankton assemblies studied in the northern JRA showed composition characteristics, relative abundance, density, and ecological indexes similar to those found for other assemblies in the upperwater mass (UCW) in the tropical region

(Margalef, 1969; Deevy and Brooks, 1971; Longhurst and Harrison, 1989), the Caribbean (Carbonell, 1981; Hopcroft *et al.*, 1998a, 1998b; Weber *et al.*, 2005) and the CSC (Garay *et al.*, 1988; Téllez *et al.*, 1998; Medellín-Mora and Martínez-Ramírez, 2010; Gutiérrez-Salcedo, 2011). This community is characterized for having at least 100 phytoplankton species dominated by diatoms, although in some cases dinoflagellates maybe more important and in others even cyanobacteria. There are also more than 50 zooplankton families and their abundance in this group exceeds 500 ind/m³. In composition as well as in abundance copepods are 60% or more of the group. Also, these assemblies show low predominance and high uniformity and diversity, close to the maximum. All these characteristics allow cataloguing the assemblies in this study within the planktonic community of typical oligotrophic oceanic tropical waters (TOOTW) (Longhurst, 1982a, 1985b; Longhurst and Harrison, 1989).

The lack of oceanographic information in the study area does not allow relating the biological community to its environment and thus compare it to other studies. Therefore, the following analyses are assumptions or hypothesis about the structure of the assemblies at a local scale are based on other studies with similar biological information.

The presence of different associations was mainly conditioned by the relative and total abundance of phyto and zooplankton, respectively, evidencing that association II (Alicia Shoal and Serranilla Bank) abundances where 10 times higher than those of association I (Nuevo Shoal and Macondo Guyot). The third phytoplankton association differed from the second one due to composition aspects that show a greater dominance of central diatoms. The only station showed the lowest abundance with a dominance of cyanobacteria and harpacticoids.

As mentioned, these associations are conformed geographically. Association II is found towards the western sector of the JRA, while the other two associations and Station E 295 are located on the other side. The possible separation may be due to the geophysical structure and ocean dynamics, creating associations due to mainly physical actions because they generate ideal environmental conditions or a combination of both.

The first assumption or hypothesis is that the greater abundance of association II is due to a purely physical grouping of the planktonic community. This may be due to the confluence of the internal meanders of the CSC that arrive to the area from San Andrés (Garay *et al.*, 1988) and the geophysical formation of Serranilla Bank and Alicia Shoal, with peaks closer to the surface and a larger area than those of the other sector (Macondo Guyot and Nuevo Shoal) (Vega-Sequeda *et al.*, 2015). These two characteristics accelerate the flow of the water mass preventing plankton from moving from one place to the other and causing an agglomeration

near the formations. This situation has been proven in other studies, such as the one by Incze *et al.* (2001), who showed that a simple collision between ocean fronts resulted in abundance of the planktonic community.

The second assumption or hypothesis is that the area of association II shows conditions that favors the growth of the planktonic community due to a larger food offer. This may be possibly based on: 1) that the Serranilla Bank and Alicia Shoal (Association II) show a greater diversity of food for the planktonic community; 2) These two geomorphological traits have an area that doubles that of the other two geomorphological traits (Macondo Guyot and Nuevo Shoal -Association I-), therefore creating a larger area for benthic diversity to generate a larger food offer; and 3) the current that passes through Serranilla Bank and Alicia Shoal is shallower, allowing for a constant resuspension of the nutrients necessary for planktonic growth. This behavior has been evidenced in other studies of the region where it was found that a water mass that arrives to San Andrés on its southern side causes a phytoplankton bloom, mainly of diatoms, which generates a larger zooplankton growth evidenced in the northwestern side (Campos-González, 2007; Martínez-Barragán, 2007).

For the case of station E 295, located close to the Macondo Guyot, association I was possibly separated due to another oceanographic factor. Studies of submarine mountains have shown that when a current passes through them it may generate a vertical anticyclonic circulation cell, creating a different space than the rest of the sector with a possible low interaction of planktonic assemblies (Hamner and Hauri, 1981; Genin, 2004).

The composition of the species of each association allows corroborating that they are the same community but that due to local conditions they are differently structured, supporting the aforementioned hypotheses. Association I is dominated by filamentous cyanobacteria, organisms that take nitrogen from the atmosphere and proliferate when nutrients are poor and the waters are calm (Margalef, 1972; Gómez *et al.*, 2005). A greater proportion of dinoflagellates than diatoms were also found, confirming the water mass oligotrophy (Margalef, 1972). These organisms are the food for the copepod family Corycaeidae (Kleppel and Piper, 1984) and larvaceans (Allredge and Silver, 1988; Steinberg *et al.*, 1993), zooplankters with the largest abundance in the association. This last group produces marine snow that allows cyanobacteria to proliferate easier, as well as copepods of the family Oncaeidae because it provides substrates for them to feed of these algae (Steinberg *et al.*, 1994). The presence of carnivores such as chaetognaths with medium abundances in comparison to the other groups allows to conclude that this assembly shows a classic trophic network (Sullivan, 1980). Lastly, the larger quantity of crustacean larvae in

this association would lead us to conclude that possibly the benthic communities of Nuevo Shoal and Macondo Guyot could contain high abundance of these organisms.

Association II was dominated by diatoms which is why the water in this sector showed input of a larger quantity of nutrients in relation to the previous association (Margalef, 1972). Being responsible for productivity, the trophic network would be composed of larger organisms, corroborating the presence of polychaetes (Halanych *et al.*, 2007). This would also attract a larger diversity of carnivores such as amphipods and copepods of the family Tortanidae, as well as chaetognaths (Wickstead, 1959; Gasca and Shih, 2001). Also, high predation would cause much of the particulate organic matter to be used by the omnivore and detritivore species such as the families Paracalanidae (Stoecker and Sanders, 1985), Calanidae, Clausocalanidae (Kleppel *et al.*, 1988; McKinnon, 1996) and Acartiidae (De Oliveira-Díaz *et al.*, 2010), groups with medium abundance in this association and that also feed on diatoms. Lastly, just like in the previous association, benthic communities in the shallows of the submarine accidents Alicia Shoal and Serranilla Bank may have a high abundance of echinoderms and fish, as evidenced in the work of Vega-Sequeda *et al.* (2015).

Association II only includes phytoplankton. This situation could be due to the response time of this community to environmental changes, which is hours or a few days, while the zooplankton reacts only after one week (Margalef, 1972). The presence with greater relative abundance of genera such as *Chaetoceros*, *Bacteriastrum*, *Pseudonitzschia*, and *Leptocylindrus* would let to infer that the water mass presents coastal conditions since they are typical of these systems (Garay *et al.*, 1988) and could have been brought by the current from the Magdalena river (Cañón-Páez and Santamaria del Ángel, 2003) or the Panama-Colombia Gyre, affecting the study area and modifying its planktonic structure (Martínez-Barragán, 2007; Gutiérrez-Salcedo, 2011).

Lastly, the E 295 station was characterized by a dominance of crococale cyanobacteria that grow in more calm water conditions and with high solar incidence (Margalef, 1972), generating large enough aggregations so that organisms such as copepods from the harpacticoidan group seek refuge and food to proliferate (Calef and Grice, 1966; Roman, 1978; Boxshall and Halsey, 2004). Additionally, confirm a possible vertical cell over the guyot because these organisms are strongly related to very calm waters (Boltovskoy, 1981; Boxshall and Halsey, 2004). However, due to the absence of physical data it is just a hypothesis yet to be proven.

CONCLUSIONS

The northern sector of the JRA showed a planktonic community categorized as coming from typical tropical oceanic oligotrophic waters. The associations found were geographical and quite possibly controlled by ocean dynamics.

The western sector (Alicia Shoal and Serranilla Bank) showed a community structure dominated by diatoms and calanoids, a characteristic of waters with contributions of nutrients and organisms of a larger trophic network than the one in the eastern sector (Nuevo Shoal and Macondo Guyot), which presented organisms of oligotrophic and calm waters with smaller body sizes such as filamentous cyanobacteria and poecilostomatoid copepods.

The separation of station E 295 could be due to an oceanic condition, a circulation cell generated by the guyot, isolating the assembly and generating a condition for proliferation of crococal cyanobacteria and harpacticoidans.

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Annex 1. Percent Abundance (%) of phytoplankton species or morphotypes found in the 21 stations of the Joint Regime Area between Jamaica and Colombia during October 2011. Divisions: Chl. Chlorophyceae; Cya. Cyanobacteria; Din. Dinophyta (dinoflagellates); and Bac. Bacillariophyta (diatoms).

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | | |
|--|------|------|-----|------|------|------|------|------|------|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | |
| Chlorophyceae sp. (Chl) | | | | | | | | | | | | | | | | | | | | | | |
| Chroococcales sp. 1 (Cya) | 43.9 | | | | | 0.6 | | | | | | | | | | | | | | | | 0.4 |
| Chroococcales sp. 2 (Cya) | 3.7 | | | | | | | | | | | | | | | | | | | | | |
| Chroococcales sp. 3 (Cya) | 15.0 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 1.2 | 1.4 | 1.6 | | | 0.6 | 0.6 | 0.6 | 0.4 | | | | | | | |
| <i>Lyngbya</i> sp. (Cya) | | | 0.2 | | | | 0.6 | | 0.2 | | | | | | 0.7 | 0.3 | | | | | | |
| <i>Oscillatoria</i> sp. 1 (Cya) | 3.5 | 2.8 | 4.2 | 2.5 | 1.2 | 4.4 | 3.0 | 10.5 | 7.6 | 1.1 | 1.3 | 0.6 | 3.0 | 0.4 | 1.6 | 1.9 | 1.3 | 0.2 | | | | 1.5 |
| Oscillatoriales sp. 1 (Cya) | 6.0 | 11.2 | 2.8 | 19.3 | 19.0 | 16.7 | 13.7 | 52.1 | 37.4 | 1.1 | | 8.9 | 13.6 | 5.4 | 0.7 | 5.8 | 6.4 | 6.4 | 0.2 | | | 4.0 |
| Oscillatoriales sp. 2 (Cya) | 3.7 | | 4.8 | 13.9 | 1.1 | 0.6 | 2.8 | 11.3 | 1.7 | | | 2.5 | 2.3 | 1.2 | 1.0 | | | | | | | 1.1 |
| <i>Richelia</i> sp. (Cya) | 0.7 | 1.4 | 2.1 | | | | 0.6 | 0.3 | 0.5 | 1.1 | | 1.3 | 0.6 | 0.4 | | | | | | | | 0.4 |
| <i>Synechococcus</i> sp. (Cya) | | | | | | | | | | | | | | | | | | | | | | 0.6 |
| <i>Thirichodesmium</i> sp. (Cya) | 17.3 | 7.5 | 2.1 | 15.9 | 26.6 | 12.8 | 3.0 | 6.6 | 15.2 | 4.5 | 1.3 | 2.5 | 1.9 | 0.6 | 0.4 | 5.2 | 1.3 | | | | | 2.8 |
| <i>Alexandrium</i> sp. (Din) | 1.6 | 0.9 | 2.8 | 2.1 | | 1.1 | | | | | | | | | | | | | | | | |
| <i>Amphisolenia</i> sp. 1 (Din) | 0.9 | | 0.7 | | | | | | | | 0.6 | | | | | | | | | | | 0.1 |
| <i>Amphisolenia</i> sp. 2 (Din) | | | | | | | | | | | | | | | | | | | | | | |
| <i>Ceratocorys armata</i> (Din) | | | | | | | 0.6 | | 0.6 | | | | | | | | | | | | | |
| <i>Ceratocorys horrida</i> (Din) | 1.9 | 0.9 | 0.2 | 1.8 | 3.3 | 4.2 | 0.7 | 0.9 | | 1.3 | 3.8 | 1.9 | 1.2 | 3.3 | 1.3 | 0.6 | 7.7 | 0.4 | 1.4 | 0.2 | | |
| <i>Ceratocorys</i> sp. (Din) | | | | | | | | 0.2 | | | | | 0.6 | | | | | | | | | |
| <i>Citharistes</i> sp. (Din) | | | | | | 1.1 | | | | | | | | | | | | | | | | |
| <i>Corythodinium</i> sp. (Din) | 1.3 | 0.7 | | | | 1.1 | | | | | | | | | | | | | | | | |
| Dinophyceae sp. (Din) | 0.3 | 0.7 | | | | | | | | | | 0.6 | | | | | | | | | | |
| <i>Dinophysis</i> cf. <i>caudata</i> (Din) | | | | | | 0.2 | | | | | | | | | | | | | | | | |
| <i>Dinophysis</i> cf. <i>tripos</i> (Din) | 0.6 | | | | | | | | | | | | | | | | | | | | | |
| <i>Dinophysis</i> sp. 1 (Din) | 0.9 | | 4.9 | 3.4 | | 0.6 | | | | | | | | | | | | | | | | |
| <i>Dinophysis</i> sp. 2 (Din) | | | | 0.7 | | 1.7 | | | | | | | | | | | | | | | | |
| <i>Dinophysis</i> sp. 3 (Din) | 0.7 | 0.2 | | | | | 1.2 | | 0.2 | | 0.6 | 1.3 | 0.6 | 0.7 | 0.6 | | 1.3 | 0.2 | 0.2 | | | 0.3 |
| <i>Dinophysis</i> sp. 4 (Din) | | | | | | | | 0.7 | | | | | | | | | | | | | | |
| <i>Goniodoma polyhedricum</i> (Din) | 0.6 | | 2.1 | 1.1 | | 0.6 | 1.2 | 1.4 | 0.2 | 1.3 | 0.3 | 3.0 | 0.7 | | | | 5.1 | 0.4 | | | | |
| <i>Goniodoma</i> sp. (Din) | | | | | | | 0.6 | 0.3 | | 0.6 | | | | | | | 1.6 | | | | | 1.3 |
| <i>Gonyaulax</i> sp. 1 (Din) | 1.9 | 0.9 | 0.7 | 2.5 | 0.6 | 2.8 | | 0.3 | 0.5 | 1.1 | 0.6 | 1.3 | 1.2 | 0.4 | 0.6 | | | | | | | |
| <i>Gonyaulax</i> sp. 2 (Din) | | | | | | 0.3 | 0.6 | 1.2 | | | | | | | | | | | | | | |
| <i>Heterocapsa</i> sp. (Din) | 0.3 | | 2.1 | 0.7 | | | | | | | | | | | | | | | | | | 0.4 |

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | | |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | |
| <i>Histonis</i> sp. (Din) | 0.5 | 0.6 | 0.6 | | | | | | | | | | | | | | | | | | | |
| <i>Neoceratium candelebrum</i> (Din) | | | | 0.2 | 0.3 | | | 0.3 | 0.2 | 0.6 | | | 0.3 | | 0.4 | 0.6 | | | | | | |
| <i>Neoceratium contortum</i> (Din) | 1.3 | 0.7 | | 0.6 | 0.6 | 0.7 | | 0.6 | 0.6 | 0.6 | | 0.6 | 0.6 | 0.6 | 0.7 | | 0.6 | 1.3 | 0.2 | 0.2 | | 0.2 |
| <i>Neoceratium furca</i> (Din) | 1.9 | 0.7 | 0.5 | 1.5 | 1.7 | 1.2 | | 0.2 | 1.7 | 0.6 | | 0.6 | 0.3 | 0.7 | 0.7 | | 0.6 | 0.4 | 0.8 | 1.1 | | 1.1 |
| <i>Neoceratium fuscus</i> (Din) | 0.6 | | | 0.6 | | | | 0.5 | 1.7 | 3.2 | | 0.6 | 1.8 | 0.7 | 0.3 | | | 0.4 | | | | 0.4 |
| <i>Neoceratium horridum</i> (Din) | 0.3 | 0.7 | | 0.6 | 0.6 | 1.4 | 2.5 | 1.1 | 0.6 | 0.6 | 1.3 | 1.2 | 0.4 | 0.6 | 1.9 | 1.3 | | | | | | 0.4 |
| <i>Neoceratium kofoidii</i> (Din) | | | | 0.6 | 1.1 | 1.8 | 0.3 | 0.9 | 6.2 | | | 3.0 | 2.9 | | | | | | | | | 0.7 |
| <i>Neoceratium limulus</i> (Din) | | | | 0.6 | 1.7 | 0.6 | | 0.2 | | | | 0.3 | 0.6 | | | | | | | | | 0.2 |
| <i>Neoceratium lunula</i> (Din) | 0.3 | | 0.2 | 1.7 | | | | | | | | | | | 0.7 | | | 0.2 | | | | 0.4 |
| <i>Neoceratium macroeros</i> (Din) | 0.3 | 1.4 | 0.9 | 1.7 | | | | 0.6 | 0.6 | | | | | 0.3 | 0.6 | | | | | | | 0.4 |
| <i>Neoceratium minutum</i> (Din) | | | | | | | | 0.3 | | | | | | | 0.4 | | | | | | | |
| <i>Neoceratium paradoxides</i> (Din) | 0.3 | | | | | | | | | | | 0.6 | | | | | | | | | | |
| <i>Neoceratium praelongum</i> (Din) | | | | | 0.3 | | | | | | | 1.6 | 0.6 | 0.6 | 0.7 | | | | | | | 0.3 |
| <i>Neoceratium setaceum</i> (Din) | | | | 0.2 | 0.6 | 0.6 | 0.3 | 0.2 | 0.6 | | | 0.6 | 0.6 | 0.7 | | | | | | | | 0.3 |
| <i>Neoceratium</i> sp. 1 (Din) | 0.9 | 0.7 | | 0.3 | | 1.2 | 0.3 | | | | | | | | | | | | | | | |
| <i>Neoceratium</i> sp. 2 (Din) | | | | | | | | | | | | 0.6 | 0.6 | 1.2 | | | | | | | | |
| <i>Neoceratium</i> sp. 3 (Din) | | | | | | | | | | | | 0.6 | 0.6 | 1.2 | | | | | | | | 0.3 |
| <i>Neoceratium</i> sp. 4 (Din) | | | | | | | | | | | | | | | | | | | | | | 0.2 |
| <i>Neoceratium</i> sp. 5 (Din) | | | | | | | | | | | | | | | | | | | | | | |
| <i>Neoceratium</i> sp. 6 (Din) | 0.3 | 1.4 | | 0.3 | 0.6 | | | | | | | | | 0.6 | 0.7 | 0.6 | | | | | | |
| <i>Neoceratium symmetricum</i> (Din) | 8.8 | 0.9 | 9.2 | 3.0 | 5.1 | 5.6 | 3.0 | 1.4 | 0.9 | 3.4 | 0.6 | 0.6 | 1.9 | 1.8 | 1.1 | 1.0 | 0.6 | 1.3 | 0.4 | | | 1.1 |
| <i>Neoceratium teres</i> (Din) | 0.6 | 0.9 | | 0.2 | 1.2 | 2.2 | 1.2 | 0.7 | 0.5 | 3.4 | | 1.3 | 2.6 | 1.2 | 0.4 | 0.6 | 0.6 | | 0.8 | 0.3 | | 0.7 |
| <i>Neoceratium trichoceros</i> (Din) | | | | 1.4 | 0.6 | 0.6 | 0.6 | 1.4 | 0.6 | 0.6 | | | 1.2 | 1.8 | 0.3 | | | | | | | 0.3 |
| <i>Neoceratium tripos</i> (Din) | | | | 0.2 | 1.1 | 1.8 | 1.4 | 0.7 | 1.3 | | | 0.3 | | | | | | | | | | 0.2 |
| <i>Neoceratium vultur</i> (Din) | | | | | | | | 0.3 | 0.2 | 1.3 | | | | | | | | | | | | |
| <i>Ornithocercus magnificus</i> (Din) | 2.2 | 5.6 | 1.6 | 0.6 | 2.2 | 4.2 | 1.7 | 1.6 | 3.9 | 6.4 | 2.5 | 1.3 | 3.6 | 1.8 | 3.9 | 4.5 | 9.0 | 1.4 | 0.5 | | | 0.6 |
| <i>Ornithocercus quadratus</i> (Din) | 0.3 | | 0.2 | | | 1.2 | | | | | 0.6 | 0.6 | 0.6 | | | | | | | | | |
| <i>Ornithocercus</i> sp. (Din) | | | | | | | | | | | | 0.3 | | | | | | | | | | |
| <i>Ornithocercus steinii</i> (Din) | | | | 0.7 | 1.8 | 0.3 | 2.4 | 0.2 | | | | 3.6 | | | | | | | | | | |
| <i>Oxyphysis</i> sp. (Din) | 2.8 | | | | | | | | | | | | | | | | | | | | | |
| <i>Oxytoxum</i> sp. (Din) | 0.6 | | | | | 0.6 | 0.6 | | | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | | | | | | | 0.6 |
| <i>Phalacroma</i> cf. <i>rapa</i> (Din) | | | | | 0.9 | 0.6 | | | | | | | | | | | | | | | | |
| <i>Phalacroma</i> sp. 1 (Din) | 2.5 | 1.9 | 0.7 | | 3.9 | 0.6 | 1.2 | 0.2 | | | | | | | 0.3 | 1.3 | | | | | | 0.2 |
| | | | | | | | | | | | | | | | | | | | | | | 0.1 |

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|------|------|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | | |
| <i>Phalacroma</i> sp. 2 (Din) | | | 0.7 | | | | | | | | | | | | | | | | | | | | |
| <i>Phalacroma</i> sp. 3 (Din) | | | | | 0.9 | 0.6 | | | | | | 0.6 | 0.6 | 0.6 | | | | 1.3 | | | | | |
| <i>Phalacroma</i> sp. 4 (Din) | | | | | 0.3 | | | | | | | | | | | | | | | | | | |
| <i>Phalacroma doryphorum</i> (Din) | | | | | | 0.6 | 0.6 | | | | | 0.3 | 0.6 | 0.6 | 0.6 | 0.6 | | | | | | | |
| <i>Plagiotropis</i> sp. (Din) | | | | 0.2 | | | | | | | | | | | 0.4 | | | | | | | | |
| <i>Podolampas bipes</i> (Din) | 1.9 | 0.9 | 2.8 | 0.7 | 0.3 | 1.1 | 2.4 | | | 0.6 | 0.6 | 0.6 | 4.8 | 1.8 | 0.3 | 0.6 | 0.6 | 0.6 | 0.3 | | | | |
| <i>Podolampas elegans</i> (Din) | 1.6 | 0.9 | 0.7 | | 0.9 | 1.1 | 3.6 | 0.3 | 1.2 | 2.8 | 1.9 | 0.6 | 0.3 | 7.1 | 0.4 | 1.3 | 2.5 | 17.9 | 1.2 | 0.3 | 1.5 | | |
| <i>Podolampas</i> sp. (Din) | 0.3 | | | | | 1.1 | 0.6 | | | | | | | 0.7 | 0.3 | 0.6 | | | | | | | |
| <i>Prorocentrum gracile</i> (Din) | | | | 0.2 | | | | | | | | | | | | | | | | | | | |
| <i>Prorocentrum micans</i> (Din) | | | 0.7 | 0.2 | | | | | | | | | | | | | | | | | | | |
| <i>Prorocentrum</i> sp. 1 (Din) | 0.3 | | 0.5 | | 0.6 | 0.6 | 0.2 | | | 0.6 | | | | | | | | | | | | | |
| <i>Prorocentrum</i> sp. 2 (Din) | 0.3 | | 3.0 | 0.3 | | 0.6 | | | | 0.6 | | | | | | | | | | | | | |
| <i>Prorocentrum</i> sp. 3 (Din) | | | | | | | | 0.3 | | | | | | | | | | | | | | | |
| <i>Protoperidinium elegans</i> (Din) | | | | | | 1.2 | 0.3 | | | 2.5 | 1.3 | 2.3 | 1.8 | 0.3 | 0.6 | 0.4 | 0.3 | | | | | | |
| <i>Protoperidinium</i> sp. 1 (Din) | 1.9 | 0.7 | 0.5 | 0.3 | 0.6 | 0.6 | | | 0.6 | | | | | | | | | | | | | | |
| <i>Protoperidinium</i> sp. 2 (Din) | 1.9 | 2.8 | 1.6 | 0.3 | 1.1 | | | | 0.6 | | | | | | | | | | | | | | |
| <i>Protoperidinium</i> sp. 3 (Din) | 0.3 | 0.7 | | | | 0.6 | | | | | | | | | | | | | | | | | |
| <i>Protoperidinium</i> sp. 4 (Din) | 0.3 | | 0.2 | 0.3 | 0.6 | | | | | | | | | | | | | | | | | | |
| <i>Protoperidinium</i> sp. 5 (Din) | | 0.7 | | | 0.6 | | | | | 1.1 | | 1.3 | 1.2 | 0.3 | 0.2 | 0.2 | 0.4 | | | | | | |
| <i>Protoperidinium</i> sp. 6 (Din) | | | | | | 0.3 | | | | | | | | | | | | | | | | | |
| <i>Pyrocystis fusiforme</i> (Din) | | | | | 0.3 | 0.6 | | | 0.5 | 6.4 | 1.3 | 0.6 | 2.4 | 0.4 | 0.3 | 1.3 | 1.3 | 0.4 | | | | | |
| <i>Pyrocystis</i> sp. 1 (Din) | 0.3 | | | | 0.3 | 1.7 | | | 0.5 | 1.7 | | | 0.7 | | | | 2.6 | | | | | | |
| <i>Pyrocystis</i> sp. 2 (Din) | | | | | 1.2 | 0.3 | 0.7 | 0.6 | 0.6 | | | 0.6 | 1.5 | | | 1.3 | 0.2 | 0.2 | | | | | |
| <i>Pyrophacus</i> sp. (Din) | | | | | 0.3 | 0.5 | 0.6 | | 0.6 | | | 0.6 | 0.6 | 0.4 | 1.0 | 0.8 | | | | | | | |
| <i>Scrippsstella</i> sp. (Din) | 0.3 | | 2.8 | 0.7 | | 0.6 | | | | | | | | | 0.3 | | | | | | | | |
| <i>Spiraulax kofoidii</i> (Din) | | | | | | | 0.3 | | | 2.5 | | | | | | | | | | | | | |
| <i>Achmanthes</i> sp. (Bac) | | | | | | | | | 0.6 | 1.9 | | | | | | | | | | | | | |
| <i>Amphora ocellata</i> (Bac) | | | | | | | | | | 0.6 | | | | | | | | | | | | | |
| <i>Amphora</i> sp. (Bac) | | | 0.5 | | | | | | | | | | | | | | | | | | | | |
| <i>Asterionella</i> sp. (Bac) | | | 3.2 | | | | 0.9 | | | | | | | | | | | | | | | | |
| <i>Asterolampra</i> sp. (Bac) | 0.9 | | 0.7 | 0.6 | 1.1 | 0.6 | 0.3 | 0.5 | 0.6 | 1.9 | 0.6 | 1.3 | 2.4 | 1.5 | 1.6 | 3.2 | 0.4 | 0.6 | 0.7 | | | | |
| <i>Asteromphalus</i> sp. (Bac) | | | 0.2 | 0.3 | 0.6 | | 0.7 | | | | | 0.6 | | | | | | | | | | | |
| <i>Bacteriastrium furcatum</i> (Bac) | 0.3 | | | | | 0.6 | | | | | | | | | 0.6 | | | | | | 6.5 | 10.2 | 11.0 |

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | | |
|---|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | |
| <i>Bacteriarum</i> sp. (Bac) | | | | | | | | | | | | | | | | | | | | | | 0.4 |
| <i>Biddulphia</i> sp. (Bac) | | | 0.2 | | | | | | | | | | | | | | | | | | | |
| <i>Bleekerella</i> sp. (Bac) | | | 1.8 | | | | | | | | | | | | | | | | | | | |
| <i>Campylodiscus</i> sp. (Bac) | | | | | | | | | | | | 1.5 | 0.6 | | | | | | | | | |
| <i>Chaetoceros affinis</i> (Bac) | 0.3 | | | | | | | | 0.6 | | | | | | | | | | | 4.7 | 6.4 | 3.3 |
| <i>Chaetoceros curvisetus</i> (Bac) | | | | | | | | | | | | 1.1 | | | | | | | | 1.0 | 2.3 | 0.7 |
| <i>Chaetoceros deceptiens</i> (Bac) | | | | | | | | | | | | | | | | | | | | 2.7 | 2.7 | 1.1 |
| <i>Chaetoceros diversus</i> (Bac) | 0.3 | | | | | | | | 1.3 | | | 0.3 | | | | | | | | 3.7 | 2.8 | 2.2 |
| <i>Chaetoceros dymidus</i> (Bac) | | | | | | | | | | | | | | | | | | | | 0.2 | | 0.2 |
| <i>Chaetoceros laciniatus</i> (Bac) | | | 0.5 | | | | | | | | | | | | | | | | | | | 0.2 |
| <i>Chaetoceros lauderi</i> (Bac) | | | | | | | | | | | | 3.6 | | | | | | | | 2.5 | 5.2 | 2.0 |
| <i>Chaetoceros lorenzianus</i> (Bac) | 1.3 | | 0.3 | | | | | | 0.6 | 0.6 | 0.3 | 1.2 | | | | | | | | 4.5 | 4.2 | 3.7 |
| <i>Chaetoceros peruvianus</i> (Bac) | 1.3 | | 0.2 | | | | | | | | | 0.3 | | | 1.5 | 1.3 | 0.6 | 2.6 | 2.2 | 1.0 | 2.2 | |
| <i>Chaetoceros seriacanthum</i> (Bac) | | | | | | | | | | | | | | | | | | | | | | 0.2 |
| <i>Chaetoceros</i> sp. 1 (Bac) | | | | | | | | | | | | 0.3 | | | | | | | | 2.2 | | 1.1 |
| <i>Chaetoceros</i> sp. 2 (Bac) | | | | | | | | | | | | | | | | | | | | 0.6 | | 0.4 |
| <i>Chaetoceros</i> sp. 3 (Bac) | | | | | | | | | | | | 0.6 | | | | | | | | 1.0 | | 1.3 |
| <i>Chaetoceros</i> sp. 4 (Bac) | | | | | | | | | | | | | | | | | | | | 3.5 | 2.8 | 1.8 |
| <i>Chaetoceros</i> sp. 5 (Bac) | | | 0.7 | | | | | | 0.2 | 0.6 | 1.9 | 1.2 | 0.4 | | | | | | | 1.3 | 0.6 | 3.6 |
| <i>Chaetoceros</i> sp. 6 (Bac) | | | | | | | | | | | | | | | | | | | | | | 2.3 |
| <i>Chaetoceros</i> sp. 7 (Bac) | | | | | | | | | | | | | | | | | | | | | | 0.6 |
| <i>Climacosphenia</i> cf. <i>moniligera</i> (Bac) | | | | | | | | | | | | 1.5 | | | | | | | | | | |
| <i>Cocconeis</i> sp. (Bac) | | | | | | | | | | | | | | | | | | | | | | |
| <i>Coscinodiscus centralis</i> (Bac) | 0.6 | | 0.7 | 0.2 | 0.3 | | | | 0.7 | 1.1 | 0.6 | 1.3 | 0.3 | 1.8 | 0.4 | 1.0 | 0.6 | | | 0.4 | 2.9 | 0.4 |
| <i>Coscinodiscus curvatus</i> (Bac) | 0.3 | | 0.7 | 0.2 | 1.1 | 1.2 | | | 0.2 | 2.5 | 0.3 | 1.8 | 0.7 | 0.6 | | | | | | 0.8 | 0.8 | 0.7 |
| <i>Coscinodiscus granii</i> (Bac) | | | | | | | | | | | | | | | | | | | | | | 1.6 |
| <i>Coscinodiscus marginatus</i> (Bac) | 2.5 | 2.8 | 12.0 | 2.3 | 1.8 | 1.1 | 1.2 | 2.1 | 0.2 | 2.5 | 0.6 | 1.9 | 1.2 | 0.4 | 1.9 | 7.7 | | | | 2.0 | 0.2 | |
| <i>Coscinodiscus</i> sp. 1 (Bac) | 1.6 | 0.9 | 0.7 | | | 1.1 | | | | | | | | | 0.4 | | | | | | | |
| <i>Coscinodiscus</i> sp. 2 (Bac) | 0.3 | | | | | 0.6 | | | 0.5 | | | 1.8 | | | | | | | | 0.4 | 1.4 | 1.7 |
| <i>Coscinodiscus waitesii</i> (Bac) | | | | | | 0.6 | | | | | 0.6 | | | | 0.6 | | | | | | | |
| <i>Cylindrotheca</i> sp. 1 (Bac) | 0.6 | | 0.2 | | | 7.1 | 0.3 | 0.2 | 1.3 | 1.9 | 0.3 | 0.6 | 0.4 | 0.6 | 5.1 | 3.8 | | | | | | |
| <i>Cylindrotheca</i> sp. 2 (Bac) | | | 0.2 | | | 1.2 | | | | | | | | | 1.3 | | | | | | | |
| <i>DicryBaca</i> cf. <i>fibula</i> (Bac) | | | 1.4 | | | | | | 0.2 | | | | | | | | | | | | | 0.1 |

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|------|-----|------|-----|-----|-----|-----|-----|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | |
| <i>Diploneis</i> sp. 1 (Bac) | | | | | | | | | | | | | | | 0.4 | | | | | | | |
| <i>Diploneis</i> sp. 2 (Bac) | | | | 0.2 | | | | | | | | | | | | | | | | | | |
| <i>Eunotogramma</i> sp (Bac) | | | | | | | | | | | | | | | | 0.3 | | | | | | |
| <i>Fragilaria</i> sp. 1 (Bac) | 0.3 | 0.7 | 0.3 | 0.3 | 0.3 | 0.2 | 1.7 | 1.3 | 1.6 | 0.3 | | | | | | | | | | | | 0.7 |
| <i>Fragilaria</i> sp. 2 (Bac) | | | | | | 0.6 | | | | | | | | | | | | | | | | |
| <i>Fragilaria</i> sp. 3 (Bac) | | | | | | | | | | | | | | | | 2.2 | | | | | | |
| <i>Guinardia flaccida</i> (Bac) | | | | | | | | | | 0.6 | | | | | | | | | | | 1.0 | 1.7 |
| <i>Guinardia striata</i> (Bac) | 2.5 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.6 | 1.3 | 1.6 | 0.4 | 1.9 | | | | | | | | | 2.7 | 4.8 | |
| <i>Haslea</i> sp. (Bac) | 0.7 | 0.2 | 1.2 | 0.3 | 0.6 | 0.6 | 0.6 | 1.3 | 1.6 | 0.4 | 1.9 | | | | | | | | | | | 4.6 |
| <i>Hemiaulus haeckii</i> (Bac) | 4.4 | 3.5 | 1.1 | 0.6 | 0.6 | 1.8 | 2.4 | 0.7 | 9.6 | 15.3 | 12.7 | 12.7 | 5.4 | 3.6 | 3.2 | 7.0 | 5.1 | 3.7 | 0.8 | 4.8 | | |
| <i>Hemiaulus membranaceus</i> (Bac) | 2.2 | 1.4 | 1.4 | 1.1 | 0.6 | 0.6 | 3.2 | | | | | | | | | | | | | | | |
| <i>Hemiaulus sinensis</i> (Bac) | 0.9 | 0.7 | 0.9 | 1.8 | 1.1 | 0.6 | 1.0 | 0.2 | 1.1 | 3.2 | 1.3 | 0.3 | 3.0 | 1.1 | 0.3 | 3.2 | 2.6 | 0.2 | 2.8 | 0.7 | | |
| <i>Isthmia</i> sp. (Bac) | | | 0.2 | | | 2.4 | 0.6 | | | | | | | | 1.1 | | | | | 0.2 | | |
| <i>Lampriscus</i> sp. (Bac) | | | | | 1.7 | 0.6 | | | | | | | | | 3.3 | | | | | | | |
| <i>Leptocylindrus</i> sp. (Bac) | 0.6 | | | | | | | | | | | | | | 0.7 | | | | | | | 0.6 |
| <i>Licmophora</i> sp.1 (Bac) | | | | | | | | | | | 0.6 | | | | | | | | | | | |
| <i>Lioloma pacificum</i> (Bac) | 0.9 | 1.4 | 1.2 | 1.2 | 0.3 | | | | | | | | | | 5.5 | 5.1 | 10.6 | 3.3 | 8.1 | | | |
| <i>Mastogloia</i> sp. (Bac) | | | | | 0.3 | | | | | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 2.6 | | | | | | |
| <i>Microtabella</i> sp. (Bac) | | | 0.7 | | | | | | | 1.1 | | | | | 4.4 | | | | | | | |
| <i>Navicula</i> sp. 1 (Bac) | | | | 0.2 | | | | | | | | | | | | | | | | | | |
| <i>Navicula</i> sp. 2 (Bac) | | | | | 0.6 | | | | | 0.6 | 3.2 | | | | 1.3 | | | | | | | |
| <i>Navicula</i> sp. 3 (Bac) | 1.3 | 2.1 | 0.5 | 2.4 | 0.7 | 0.2 | 1.1 | 3.2 | 0.6 | 1.2 | 1.1 | 1.6 | 7.0 | 1.3 | 0.6 | | | | | | | |
| <i>Navicula</i> sp. 4 (Bac) | | | | 0.3 | | | | | | 0.6 | 2.5 | 1.3 | 1.9 | 1.1 | 8.3 | 0.6 | 0.2 | | | | | |
| <i>Navicula</i> sp. 5 (Bac) | | | 1.8 | 0.6 | 1.2 | | | | | 0.6 | | | | | 10.9 | 0.6 | | | | | | |
| <i>Nitzschia</i> sp. 1 (Bac) | | | 0.2 | | | | | | | | | | | | | | | | | | | |
| <i>Nitzschia</i> sp. 2 (Bac) | | | | | | 0.6 | | | | | | | | | | | | | | | | |
| <i>Nitzschia</i> sp. 3 (Bac) | 1.4 | | | | | | | | | | | | | 1.2 | | 0.2 | | | | | | 0.2 |
| <i>Paralia sulcata</i> (Bac) | | | | | | | | | | | | | | | | 0.3 | | | | | | |
| <i>Pleurosigma</i> sp. 1 (Bac) | | | | | | | | | | | | | | | 1.5 | | | | | | | |
| <i>Pleurosigma</i> sp. 2 (Bac) | | | | | | | | | | | | | | | 0.7 | | | | | | | |
| <i>Podocystis</i> sp. (Bac) | | | | | | | | | | | | | | | 0.6 | 1.1 | | | | | | |
| <i>Probosca alata</i> (Bac) | 1.9 | 1.4 | 0.2 | 0.3 | 0.6 | 0.6 | 0.3 | 0.9 | 6.2 | 4.5 | 7.0 | 14.9 | 1.8 | 1.1 | 7.8 | 9.6 | 2.5 | 1.8 | 1.7 | | | |
| <i>Pseudonitzschia</i> sp. (Bac) | | | 1.6 | | | | | | 2.8 | 6.4 | 2.5 | 9.1 | 1.2 | 6.4 | | | | | | | | 0.9 |

| SPECIES | (EF) | | | | | | | | | | | | | | | | | | | | |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 |
| <i>Pseudosolenia calcar-avis</i> (Bac) | 2.5 | 4.2 | 4.2 | 1.1 | 0.3 | 1.1 | 3.0 | 1.0 | 2.1 | 6.2 | 1.9 | 10.2 | 7.5 | 1.8 | 5.5 | 2.3 | 2.5 | 2.6 | 1.6 | 3.9 | 2.6 |
| <i>Rhizosolenia hebetata</i> (Bac) | 2.2 | 0.5 | 1.8 | 0.6 | 0.6 | 0.7 | 0.5 | 1.7 | 1.3 | 3.8 | 0.6 | 1.8 | 2.9 | 0.6 | 0.6 | 3.8 | 1.6 | 1.6 | 1.6 | 1.3 | 1.3 |
| <i>Rhizosolenia imbricata</i> (Bac) | 0.3 | 1.4 | | | | | | | | | | | | | | | | 0.8 | 3.4 | 1.7 | |
| <i>Rhizosolenia setigera</i> (Bac) | | | | | | | | 0.2 | 1.3 | 0.6 | 1.9 | 1.8 | 1.3 | 1.3 | 0.4 | | | 0.2 | 0.2 | 0.7 | |
| <i>Rhizosolenia</i> sp. 1 (Bac) | | | | | | | | | | | | | | | | | | | | | |
| <i>Rhizosolenia</i> sp. 2 (Bac) | | | | | | | | | 0.6 | | | | | | | | | 0.2 | 1.3 | | |
| <i>Skeletonema costatum</i> (Bac) | | | | | | | | | | | | | | | | | | | | | |
| <i>Stauroneis</i> sp. (Bac) | 0.9 | | | | | | | | | | | | | | | | | | | | |
| <i>Sriatella unipunctata</i> (Bac) | 0.2 | | | | | 0.6 | | | 1.1 | | | | | 3.6 | | | | | | | |
| <i>Surirella</i> sp. (Bac) | 0.2 | | | | | | | | | | | | | | | | | | | | |
| <i>Synedra</i> sp. (Bac) | | | | | | | | | | | | | | | | | | | | | 1.1 |
| <i>Thalassionema</i> cf. <i>elegans</i> (Bac) | 0.3 | 0.2 | 0.2 | 0.6 | 1.2 | 0.6 | 1.2 | 0.2 | 2.8 | 3.2 | 0.6 | 1.3 | 3.0 | 1.8 | 1.6 | 0.6 | 1.3 | 0.8 | 3.8 | 0.7 | 0.7 |
| <i>Thalassionema frauenfeldii</i> (Bac) | 0.2 | 0.2 | 0.2 | 3.0 | 0.3 | 0.5 | 8.4 | 3.8 | 1.6 | 6.0 | 2.2 | 24.0 | 4.5 | 4.7 | 3.8 | 2.9 | | | | | |
| <i>Thalassionema nitzschioides</i> (Bac) | 0.2 | 0.2 | 0.2 | 2.2 | 1.3 | | | | | | | | | 1.8 | 3.2 | | | | | | |
| <i>Thalassionema</i> sp. (Bac) | 1.3 | 2.1 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.2 | 1.7 | | | | | 0.7 | 0.6 | 0.6 | 1.0 | 0.9 | | | |
| <i>Thalassiophysa</i> sp. (Bac) | | | | | | | | | | | | | | | | | | | | | 0.7 |
| <i>Thalassiosira</i> sp. (Bac) | | | | | | | | | | | | | | | | | | | | | 0.4 |
| <i>Thalassiothrix</i> sp. (Bac) | | | | | | | | | 1.1 | 0.6 | 1.9 | 0.6 | 0.6 | 0.4 | 0.6 | | | 0.8 | | | 0.4 |
| <i>Toxarium undulatum</i> (Bac) | | | | | | | | | | | | | | | | | | | | | 2.6 |
| <i>Trigonium</i> sp. (Bac) | | | | | | | | 0.3 | | | | | | 0.6 | 0.7 | | | | | | |

Annex 2. Abundance (ind / m³) of families or main groups of zooplankton found in the 21 stations of the Joint Regime Area between Jamaica and Colombia in October 2011. Phylum: Art. Arthropoda; Mol. Mollusca; Ann. Annelida; Cha. Chaetognata; Cho. Chordata; Sip. Sipuncula; y Ech. Echinodermata.

| FAMILY | (EZ) | | | | | | | | | | | | | | | | | | | | |
|-----------------------|------|------|------|-------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|
| | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 |
| Acartiidae (Art) | 23.8 | 5.4 | 10.4 | 23.2 | 7.3 | 14.7 | 22.3 | 17.9 | 21.7 | 29.1 | 14.1 | 15.5 | 27.4 | 49.7 | 13.8 | 181.6 | 14.2 | 57.9 | 62.7 | 64.1 | 129.1 |
| Paracalanidae (Art) | 74.2 | 12.6 | 32.2 | 34.0 | 29.8 | 24.3 | 74.2 | 76.0 | 231.8 | 765.6 | 166.1 | 109.9 | 279.0 | 353.4 | 301.1 | 511.0 | 193.9 | 256.3 | 258.9 | 1358.7 | 632.1 |
| Aeideidae (Art) | 0.3 | | | | | | | | | | | | | | | | | | | | |
| Pontellidae (Art) | 0.3 | 0.3 | 4.5 | 6.1 | | 1.1 | | 2.6 | | | | | 0.5 | 0.5 | 1.9 | | | | | | |
| Arietellidae (Art) | 0.6 | | | | | 1.1 | | | | | | | | | | | | | | | |
| Augalipitidae (Art) | 0.3 | | | | | | | | | | | | | | | | | | | | |
| Epacrisocidae (Art) | 0.6 | 0.3 | 0.3 | 6.2 | 2.4 | 5.6 | | 1.3 | 10.9 | 0.7 | 2.2 | 10.0 | 9.9 | | 11.6 | 0.6 | | | | | |
| Calanidae (Art) | 59.4 | 7.7 | 27.3 | 30.6 | 28.6 | 25.4 | 76.4 | 44.7 | 199.7 | 506.2 | 96.6 | 54.4 | 202.7 | 110.9 | 349.3 | 335.2 | 154.1 | 83.6 | 145.4 | 648.9 | 258.2 |
| Candaciidae (Art) | 4.0 | | 2.6 | 2.8 | 3.7 | 4.5 | 4.5 | 1.3 | 8.9 | 2.6 | 4.3 | | 3.5 | 3.9 | 3.8 | 11.6 | 4.5 | | 6.5 | 82.6 | 26.2 |
| Centropagidae (Art) | | | 20.1 | 7.4 | 9.7 | 12.4 | 10.0 | 10.2 | 6.9 | 132.3 | 16.3 | 28.9 | 29.1 | 45.3 | 21.5 | 34.3 | 14.2 | | 5.9 | 17.3 | 31.6 |
| Clausocalanidae (Art) | 36.2 | 7.2 | 23.6 | 22.1 | 17.0 | 17.5 | 45.2 | 33.2 | 128.5 | 343.4 | 72.7 | 54.4 | 124.1 | 68.9 | 219.5 | 269.5 | 110.3 | 49.7 | 92.9 | 386.3 | 153.3 |
| Heterorhabdidae (Art) | 2.3 | | 2.0 | 1.1 | 1.2 | 1.1 | | | | | | | | | | | | | | | |
| Eucalanidae (Art) | 0.6 | 0.4 | | 0.6 | 3.7 | 4.5 | 0.6 | | 5.9 | | | | 1.7 | 0.5 | 3.8 | | | | | 23.7 | 6.7 |
| Euchaetidae (Art) | 9.1 | 2.2 | 10.6 | 15.9 | 12.2 | 36.1 | 17.8 | 8.9 | 24.7 | 21.2 | 5.4 | 8.9 | 21.5 | 13.5 | 30.5 | 33.3 | 45.5 | 3.6 | 21.6 | 12.2 | 3.4 |
| Temoridae (Art) | 7.9 | 4.9 | 2.3 | 15.8 | 30.5 | 3.3 | | 4.9 | 15.9 | 6.5 | 3.9 | 11.6 | 6.8 | 7.6 | | 2.3 | 3.6 | 5.4 | 58.9 | 74.0 | |
| Spinocalanidae (Art) | | | | | | | | | | | | | | | | | | | | | |
| Rhincalanidae (Art) | 1.7 | | | | | | | | | | | | | | | | | | | | |
| Tortanidae (Art) | | | | | | | | | | | | | | | | | | | | | |
| Corycaidae (Art) | 73.6 | 9.0 | 56.1 | 108.9 | 80.4 | 57.6 | 89.2 | 114.9 | 233.3 | 312.3 | 109.7 | 272.6 | 221.9 | 190.9 | 217.6 | 117.8 | 130.2 | 195.3 | 214.0 | 1049.3 | 400.1 |
| Oithonidae (Art) | 11.3 | 1.9 | 10.6 | 24.9 | 11.0 | 5.6 | 58.0 | 14.0 | 49.4 | 47.6 | 15.2 | 33.3 | 55.3 | 19.8 | 42.0 | 19.3 | 191.1 | 42.0 | 34.6 | 88.4 | 45.1 |
| Oncaea (Art) | 2.3 | 6.8 | 5.8 | 6.2 | 53.6 | 80.2 | 10.0 | 11.5 | 225.4 | 129.7 | 49.9 | 51.1 | 37.9 | 105.6 | 53.4 | 100.5 | 31.8 | 19.9 | 13.0 | 35.2 | 32.3 |
| Sapphirinidae (Art) | 3.4 | 1.4 | 3.2 | 6.2 | 2.4 | 6.8 | 3.3 | 3.8 | 2.0 | 7.9 | 2.2 | 4.4 | 3.5 | 0.5 | 57.3 | 3.9 | | | | | 10.1 |
| Miracidae (Art) | 6.8 | 21.7 | 2.6 | 2.3 | 4.9 | 6.8 | 2.2 | 1.3 | 50.4 | 18.5 | 22.8 | 30.0 | 40.8 | 53.0 | 56.0 | 89.3 | 1.8 | 13.5 | 89.0 | 55.1 | |
| Clytemnestridae (Art) | | | | 0.6 | | | | | 0.5 | 0.7 | | | 1.2 | 0.5 | 0.5 | 0.6 | | | | | |
| Podonidae (Art) | 4.0 | 0.9 | 0.9 | 0.6 | 2.3 | 1.1 | 2.6 | 5.9 | 10.6 | 8.7 | | 3.5 | 5.8 | 3.8 | 7.7 | | 16.3 | 6.5 | 25.6 | 29.6 | |
| Halocyprididae (Art) | 0.1 | 0.9 | | 13.4 | 0.6 | | | | | | | | 3.5 | 0.5 | | 0.6 | | | | | |
| Oxycephalidae (Art) | | | | | | | | | | | | | 0.6 | | | | | | | | |
| Gammaridae (Art) | 0.6 | | | | | | | | | | | | | | | | | | | | |
| Hyperidae (Art) | 2.3 | | 0.6 | | | 0.6 | | 4.0 | 2.2 | 2.3 | 2.9 | 5.7 | 1.0 | 9.7 | 3.6 | | | | | 5.1 | 6.1 |
| Isopoda (Art) | 0.6 | | | | | 5.6 | | | | | | | | | | | | | | | |
| Mysidae (Art) | 0.1 | 0.3 | 0.6 | 1.2 | | | | 0.5 | 2.2 | | 1.9 | 1.0 | 0.5 | 0.6 | | | | | | 0.5 | 7.7 |

(EZ)

FAMILY

| | | | | | | | | | | | | | | | | | |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|--------|--------|--------|--------|--------|
| Luciferidae (Art) | 2.3 | 0.1 | 3.5 | 1.1 | 1.2 | 7.8 | 6.4 | 2.0 | 7.9 | 4.3 | 10.5 | 2.9 | 0.5 | 0.5 | 1.8 | 0.6 | 8.1 |
| Sergestidae (Art) | | | 0.9 | | | | | | | | | | 0.5 | 2.3 | | | |
| Euphausiidae (Art) | 1.1 | | | | | | | | | | | | | | | | |
| Decapoda (Art) | 1.1 | | | | | | | 1.0 | | | | | | 0.5 | 1.8 | 0.6 | 0.7 |
| Caprellidae (Mol) | 13.6 | 0.4 | 4.3 | 1.7 | 1.2 | 0.6 | 2.6 | 23.7 | 15.9 | 2.2 | 13.3 | 18.6 | 6.8 | 0.5 | 3.4 | 25.0 | 14.5 |
| Limacinae (Mol) | 8.5 | 5.1 | 0.6 | | | 5.6 | 0.6 | 7.7 | 32.6 | 9.8 | 4.4 | 36.1 | 13.5 | 10.0 | 27.0 | 13.6 | 18.1 |
| Aleoripidae (Ann) | | 1.2 | | | | | | | | | 0.6 | 0.5 | | | | | 41.0 |
| Iosipidae (Ann) | | | | | | | | | 0.7 | | | | | | | | |
| Lopadorhynchidae (Ann) | 0.6 | 0.1 | 0.3 | | | | 0.6 | 1.0 | | 0.5 | 3.5 | | | | 0.5 | 0.6 | 2.7 |
| Polynoidae (Ann) | 0.6 | | | | | | | | | | | | | | | | |
| Tomopteridae (Ann) | | | | 0.6 | | | | 2.0 | | | | | | | | | |
| Eukrohniidae (Cha) | 1.1 | 0.1 | 0.6 | 2.8 | 0.6 | 1.1 | 1.7 | 1.3 | 2.0 | 1.3 | 0.5 | 1.7 | 1.0 | 1.0 | 1.4 | 1.1 | 0.9 |
| Krohniidae (Cha) | 5.1 | 0.6 | 2.3 | 11.9 | 3.0 | 5.1 | 8.4 | 3.8 | 8.9 | 5.3 | 1.6 | 6.1 | 7.6 | 4.8 | 5.3 | 5.1 | 3.6 |
| Sagittidae (Cha) | 44.7 | 4.6 | 18.4 | 100.3 | 26.8 | 45.2 | 73.0 | 30.6 | 75.1 | 44.3 | 12.5 | 50.0 | 67.0 | 40.0 | 40.6 | 43.8 | 28.9 |
| Salpidae (Cho) | 11.9 | 0.1 | 2.9 | 4.0 | 4.9 | 5.1 | 1.7 | 5.1 | 4.9 | | 0.5 | 1.7 | 1.2 | | | 0.5 | 24.2 |
| Oikopleuridae (Cho) | 24.9 | 15.3 | 24.8 | 84.5 | 28.0 | 3.4 | 94.8 | 93.2 | 175.0 | 121.8 | 22.8 | 87.2 | 122.3 | 216.5 | 32.0 | 117.4 | 125.7 |
| Fritillariidae (Cho) | 1.7 | 0.1 | | | | | | | 21.2 | | | | | | | | 89.0 |
| Sipuncula (Sip) | | | | | | | | | 0.7 | | | | | | 2.8 | 0.5 | 19.5 |
| Nauplios (Art) | 0.6 | 5.2 | | | | | 0.6 | | 1.3 | | | | 1.9 | | 1.1 | 12.8 | 2.7 |
| Copepodites (Art) | | 23.9 | 0.3 | 1.1 | | | | | | | | | | | | | |
| Larvas de Crustacea (Art) | 4.5 | | 4.0 | 17.6 | 4.9 | 5.6 | 5.6 | 11.5 | 50.3 | 0.5 | 1.1 | 1.2 | 2.9 | 45.8 | 3.9 | 0.6 | 3.6 |
| Larvas de Mysidae (Art) | 11.3 | | 3.5 | 9.1 | 7.3 | 0.6 | 5.6 | 15.3 | 10.9 | 5.3 | 4.3 | 11.1 | 11.6 | 24.1 | 17.7 | 11.6 | 9.1 |
| Larvas de Echinodermata (Ech) | 26.6 | 3.6 | 5.5 | 5.1 | 3.7 | 1.1 | 3.3 | 2.6 | 37.6 | | 2.2 | 0.6 | 12.8 | 12.5 | 6.2 | 63.3 | 15.9 |
| Larvas de Polichaeta (Ann) | | 0.4 | 0.6 | | | | 0.6 | 2.6 | 4.0 | 10.6 | 3.3 | 0.6 | 4.7 | 1.9 | 5.2 | 3.9 | 1.1 |
| Larvas de peces (Cho) | | 0.6 | 0.4 | 0.6 | 1.2 | | 0.6 | 3.8 | 119.1 | | 0.6 | 2.3 | | 4.3 | 0.5 | | |
| TOTAL | 441.5 | 103.7 | 274.3 | 508.5 | 371.4 | 408.1 | 610.0 | 492.8 | 1544.6 | 2653.4 | 650.3 | 843.9 | 1350.1 | 1321.1 | 1422.4 | 1895.2 | 1213.1 |
| | | | | | | | | | | | | | | | | | 825.3 |
| | | | | | | | | | | | | | | | | | 968.4 |
| | | | | | | | | | | | | | | | | | 4131.8 |
| | | | | | | | | | | | | | | | | | 2268.9 |

Annex 3. Univariate ecological indices collected from the plankton community in the Joint Regime Area between Jamaica and Colombia during October 2011. EZ: zooplankton data; EF: phytoplankton data. N: abundance (ind / m³); BS: dry biomass (mg / m³); MO: Organic matter (mg / m³); S: wealth; J: Pielou uniformity; H: Shannon diversity; H'max: maximum diversity of Shannon; λ: Prevalence of Simpson; N1: Diversity Hill; βw: Beta diversity.

| STATION | N | | BS | | MO | | S | | J' | | H' | | H' máx | | λ | | N1 | | βw | |
|---------|--------|-------|-------|------|------|--------|------|-------|------|------|------|-------|--------|------|------|------|------|------|------|------|
| | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) | (EZ) | (EF) |
| 294 | 485.1 | 17.0 | 14.6 | 65 | 33 | 0.8495 | 0.75 | 3.546 | 2.64 | 3.50 | 0.10 | 13.97 | 1.815 | | | | | | | |
| 295 | 137.3 | 2.1 | 1.4 | 17 | 24 | 0.6895 | 0.77 | 1.954 | 2.44 | 3.18 | 0.11 | 11.52 | 9.765 | | | | | | | |
| 296 | 288.7 | 32.7 | 27.0 | 51 | 32 | 0.898 | 0.77 | 3.531 | 2.66 | 3.47 | 0.10 | 14.25 | 2.588 | | | | | | | |
| 297 | 541.4 | 52.1 | 49.5 | 76 | 29 | 0.7815 | 0.72 | 3.384 | 2.42 | 3.37 | 0.13 | 11.26 | 1.408 | | | | | | | |
| 298 | 388.4 | 15.0 | 12.9 | 52 | 27 | 0.6875 | 0.81 | 2.716 | 2.66 | 3.30 | 0.10 | 14.31 | 2.519 | | | | | | | |
| 299 | 415.4 | 40.6 | 39.3 | 67 | 26 | 0.852 | 0.81 | 3.582 | 2.65 | 3.26 | 0.10 | 14.16 | 1.731 | | | | | | | |
| 300 | 625.6 | 5.4 | 4.6 | 62 | 26 | 0.8999 | 0.75 | 3.714 | 2.44 | 3.26 | 0.11 | 11.50 | 1.952 | | | | | | | |
| 301 | 529.1 | 88.7 | 84.5 | 43 | 23 | 0.5775 | 0.75 | 2.172 | 2.35 | 3.14 | 0.13 | 10.44 | 3.256 | | | | | | | |
| 302 | 1597.0 | 85.8 | 80.8 | 54 | 31 | 0.621 | 0.72 | 2.477 | 2.48 | 3.43 | 0.11 | 11.90 | 2.389 | | | | | | | |
| 303 | 2840.0 | 166.2 | 160.9 | 53 | 27 | 0.8939 | 0.67 | 3.549 | 2.20 | 3.30 | 0.16 | 9.03 | 2.453 | | | | | | | |
| 304 | 660.6 | 57.1 | 51.7 | 49 | 26 | 0.8892 | 0.72 | 3.46 | 2.34 | 3.26 | 0.14 | 10.35 | 2.735 | | | | | | | |
| 305 | 857.8 | 164.4 | 156.9 | 50 | 21 | 0.8694 | 0.76 | 3.401 | 2.31 | 3.04 | 0.15 | 10.10 | 2.66 | | | | | | | |
| 306 | 1382.7 | 202.8 | 194.3 | 46 | 30 | 0.799 | 0.73 | 3.059 | 2.48 | 3.40 | 0.12 | 11.96 | 2.978 | | | | | | | |
| 307 | 1362.6 | 101.6 | 96.5 | 57 | 29 | 0.9277 | 0.68 | 3.751 | 2.30 | 3.37 | 0.14 | 9.98 | 2.211 | | | | | | | |
| 308 | 1503.5 | 24.8 | 23.4 | 77 | 26 | 0.9018 | 0.66 | 3.917 | 2.16 | 3.26 | 0.16 | 8.66 | 1.377 | | | | | | | |
| 309 | 1978.3 | 191.1 | 182.7 | 61 | 25 | 0.7975 | 0.70 | 3.278 | 2.25 | 3.22 | 0.15 | 9.50 | 2 | | | | | | | |
| 310 | 1238.7 | 118.3 | 109.2 | 43 | 25 | 0.8839 | 0.76 | 3.325 | 2.45 | 3.22 | 0.11 | 11.54 | 3.256 | | | | | | | |
| 311 | 834.8 | 46.8 | 44.9 | 27 | 24 | 0.8928 | 0.67 | 2.942 | 2.13 | 3.18 | 0.18 | 8.44 | 5.778 | | | | | | | |
| 312 | 1000.8 | 61.0 | 58.7 | 63 | 24 | 0.8258 | 0.69 | 3.422 | 2.18 | 3.18 | 0.16 | 8.85 | 1.905 | | | | | | | |
| 313 | 4215.0 | 248.7 | 240.2 | 41 | 28 | 0.8683 | 0.59 | 3.224 | 1.96 | 3.33 | 0.21 | 7.11 | 3.463 | | | | | | | |
| 314 | 2365.7 | 351.4 | 338.4 | 64 | 29 | 0.8586 | 0.71 | 3.571 | 2.40 | 3.37 | 0.14 | 11.08 | 1.859 | | | | | | | |