Working Group on Zooplankton Ecology (WGZE)

2017/MA2/EPDSG02 The **Working Group on Zooplankton Ecology** (WGZE), chaired by Sophie Pitois, UK, and Lidia Yebra, Spain, will work on ToRs and generate deliverables as listed in the Table below.

	Meeting dates	Venue	Reporting details	Comments (change in Chair, etc.)
Year 2018	19–23 March	Helsinki, Finland	Interim report by 1 May	
Year 2019	11–14 March	Las Palmas de Gran Canaria, Spain	Interim report by 1 May	Meeting in association with WGIMT and WGPME.
Year 2020			Final report by 1 May	

ToR descriptors

ToR	Description	Background	Science Plan codes	Duration	Expected Deliverables
A	Review the use of zooplankton production methodologies in collaboration with PICES BIO WG37	a, c) Over the past two decades, quantitative evaluation of zooplankton production and its driving forces has been emphasized as a component of improving our understanding of how marine ecosystems respond to global change. While many methodologies to estimate zooplankton production have been proposed, we have limited knowledge identifying which methods are the most practical and relevant for measuring the production rates of natural zooplankton populations and/or communities across a wide range of phyla and trophic levels. The Working Group has identified and pursued the need for an evaluation of existing, new and emerging methodologies (see Reports of the Working Group ICES CM 2004/C:07, ICES CM 2011/SSGEF:01, ICES CM 2014/SSGEF:09 and ICES CM 2015/SSGEPD:05). At the workshop 'ICES/PICES cooperative research initiative: towards a global measurement of zooplankton production' (held during the 6th ICES/PICES Zooplankton Production Symposium in 2016), the community decided to propose to the PICES-BIO committee the Working Group entitled 'Zooplankton Production Methodologies, Applications and Measurements in PICES regions' (WG37) to foster targeted activities for promoting scientific collaboration and better coordination in support of knowledge transfer.. WGZE and WG37do share common interests and their collaboration is of utmost importance for the success of the ICES/PICES cooperative initiative.	1.3; 1.9	Year 1-3	Plan of collaborative activities (y1), List of scientists and laboratories measuring zooplankton production among PICES and ICES nations (y1-3), Coordinated compilation of zooplankton production data (online database, y1-3), Comparison between models in use to estimate zooplankton production (peer-reviewed publication, y2)
B	Compile data and provide expert knowledge and guidance in the definition of key traits of zooplankton	a) Zooplankton traits are increasingly needed to determine the relative fitness of plankton along environmental gradients and to predict and assess community shifts and their consequences. Although a wide range of traits has been classified in recent years, data are scattered in the literature and uncertainties	1.8 ; 1.9	Years 1-3	A compiled database of known species-level zooplankton traits for the North Atlantic and adjacent seas.

	species in the ICES area	remain from paucity of observations.			A peer-reviewed publication on the methods and data of this compiled database. A "wish list" of key zooplankton species within the ICES area that are still missing some or all trait data.
C	Recovery of "Dark Data" (datasets that are not available publicly) collected on or before WGZE time-series were started around 1990.	a, b, c) Many scientific data sets over the past 50+ years were collected at a time when the technology for curation, storage, and dissemination were primitive or non-existent, and consequently many of these datasets are not available publicly. These so-called ‘‘dark data’’ sets are essential to the understanding of how the ocean has changed chemically and biologically in response to the documented shifts in temperature and salinity (aka climate change). This ToR will seek to identify, acquire, and help make public (i.e., “bring into the light”) dark zooplankton data sets collected in the North Atlantic over the past decades. Each data set rescued by this process will be submitted for archiving and a DOI, and then made publicly available through data centers such as the ICES Data Centre, BCO-DMO, and COPEPOD. Needed are: 1) To prescribe a protocol for dark data recovery i.e. a best practice list of steps to document and submit data to a public repository. 2) To determine where dark data are located. 3) To identify and make contact with the holders of such data. 4) To engage with data holders to provide the data and metadata to a public data repository in order to make them discoverable and re-useable for future research. 5) To provide adequate citation / publication of the data (DOI) so the originator is given full credit. One example is the collection of data sets associated with the TASC program in the early 1990's. The physical data were available (they were assembled on a CD), but many of the biological data sets remains hidden in file cabinets, on originator's floppy disks, or the like. A number of WGZE members have expressed interest in “rescuing” data sets they have participated in collecting over the years, but are not currently available.	1.4; 1.9	Years 1-3	Metadata, database input, Possible peer-review publication (may produce a “data paper” such as Earth System Science Data if our efforts appear to be successful)
D	Macrozooplankton in mesopelagic zone	a, b) The mesopelagic zone, stretching from 200 to 1000 m depth, comprises about 60% of planet’s surface and 20% of the ocean´s volume, constituting a large part of the total biosphere. The bulk part of the fish of the world live there, by number as well as by biomass: a 2008 study put the world marine fish biomass at 0.899 billion tonnes, a number that is only slightly lower than the 1980 estimate	1.3; 1.9	Years 1-3	This three-year ToR will review our knowledge about the mesopelagic macrozooplankton taxonomy, abundance and biomass, trophic

		of mesopelagic fish biomass alone (~ 1 billion tonnes). It is, however, a zone of wide diversity; the dominating taxonomic groups are crustaceans, various jellyfishes and cephalopods in addition to the fishes. Recent studies indicate that the total amount of mesopelagic fish biomass globally has been grossly underestimated, possibly by a factor of 10. The new assessment suggests a biomass in the order of 10,000 million tonnes, roughly equivalent to 100 times the annual catch of traditional fisheries of about 100 million metric tons. Even though much is known about the mesopelagic community and its functioning in the marine ecosystems, still much remains unknown, especially the role of the many macroplanktonic taxa.			ecology, reproductive biology, and their impact on the flux of carbon into the deep-sea, and the role of the mesopelagic zone as a site for carbon sequestration. The aim is to produce a summary publication.
E	Analyze changes in the geographic distributions, seasonal patterns, and interannual trends of Arctic and North Atlantic macro- and meso- zooplankton species	a) Climate-related changes in the physical and chemical oceanic environment have been considered as major drivers of significant fluctuations in zooplankton. Meso- and macro-zooplankton are key components in the marine food web, hence studies on their distribution, diversity, and population dynamics are significant for understanding ecosystem dynamics. This ToR will explore long-term data on the distribution (spatial and temporal), abundance, composition, and species diversity of zooplankton in the ICES regions. Within the rapidly changing subarctic and Arctic regions, a special focus will also be given to macroplankton data series (e.g., euphausiids and amphipods). To pursue this ToR, WGZE's existing time-series compilation and analysis tools (used for the ICES Plankton Status Report) will be expanded to include and handle full species data.	1.3; 1.4; 1.9	Years 1-3	Zooplankton Status Report contribution, Link to 'dark data', Possible peer-review publication
F	Gelatinous plankton – time-series collection, and recommendations regarding monitoring	a) Gelatinous plankton plays an important role in the oceanic and coastal ecosystems, forming spectacular population blooms. Compelling evidence is showing that jellyfish bloom size, frequency, period, and magnitude is increasing, although a global increase in abundance has been widely debated. Gelatinous organisms are opportunistic species quickly adapting to environmental changes, enhancing their feeding, growth, and reproduction. Despite their increasing significance, gelatinous plankton is not conventionally monitored together with other zooplankton. Jellyfish sightings are common in the warm waters of the Mediterranean and monitoring has also become widespread in the ICES area including colder waters. However, often datasets are not available ("dark data") and a variety of methods are being used. This new ToR will providethe basis for future studies on distribution and temporal patterns of gelatinous zooplankton. Therefore, it will: i) provide an inventory of existing time-series on gelatinous plankton in the ICES area together with a compilation of metadata on the available datasets.	3.1; 3.2; 3.6	Years 1-3	Zooplankton Status Report contribution, Link to 'dark data' to provide a metadata compilation. Recommendations for the monitoring of gelatinous plankton

		ii) establish a summary of quantitative methods used in studies of gelatinous plankton and provide recommendations for the best practice for the implementation of gelatinous plankton monitoring in current time-series in the ICES area			
G	Determine the status of microzooplankton time-series data collection within the ICES area.	a, c) In 2007, a WGZE ToR reviewed the role of microzooplankton in the marine food web and concluded i) that the group should include both micro-and mesozooplankton experts and ii) that microzoplankton time-series and monitoring within the ICES area should be encouraged. This new ToR will assess progress made in this area over the last ten years and will identify any collaboration, gaps or overlap with other WGs (e.g. WGIMT; WGPME).	1.3; 1.9; 3.2; 3.4	Years 1-3	List of scientists and laboratories measuring microzooplankton groups within time-series datasets. Data table to compare sampling & analysis methods and to indicate which groups are regularly counted and which groups are routinely being missed; Database input; Webpage content update.
H	Review the applicability of continuous and real-time zooplankton techniques in long-term monitoring	a) Sampling of zooplankton today is often conducted using a combination of acoustics and imaging systems in addition to sampling with nets. Both the acoustics and imaging data provide streams of information that can, with developing classification algorithms, be analyzed and distributed in realtime. In addition, acoustic scattering techniques have the potential to provide zooplankton data at a high temporal resolution over large spatial ranges. This ToR will endeavor to provide a synthesis of current realtime systems and make recommendations for how time-series sites can enhance and modernize their data and analysis data acquisition systems.	4.1; 4.4	Years 1-3	Synthesis of current continuous and realtime systems. A recommendation document on how time-series sites can enhance and modernize their data and analysis data acquisition systems.
I	Expand and update the WGZE zooplankton monitoring and time-series compilation	a, b, c) It gives a rare opportunity to examine regional and transatlantic distribution and temporal patterns within the zooplankton time-series, including new methods identified by WKSERIES, to discern significant changes over time and to identify potential environmental or climate drivers.	1.3; 1.4; 1.9	Years 1-3	To update the next edition of the Plankton Status Report (PSR) Webpage content update Additional peer-reviewed publication
J	Design and carry out coordinated and collaborative activities with WGIMT and WGPME (including the molecular/taxonomic tasks)	c) Synergy is expected based on development of the common activities strategy	1.6; 1.8	Years 1-3	Plan of activities
K	Develop, revise and	a) Extremely important tool in terms of capacity building	1.6	Years 1-3	Updated Taxonomic

	update of zooplankton species identification keys initially focusing on the most abundant taxa at the ICES time-series sites and ensuring their availability via the web, including especially ICES Zooplankton Identification Leaflets.	of the scientific community		Leaflets uploaded to the web page
L	Planning of the 7th Zooplankton Production Symposium.	This symposium is a common initiative of ICES and PICES and if both organizations would like to keep 5-years intervals the next one should be organized in 2021. Discussion on the planning of the 7th ZPS started between WGZE and PICES Deputy Executive Secretary (Hal Batchelder). WGZE members from USA and Canada will explore possibilities to organise the next ZPS in North America.	Year 2, 3	To engage in preparations and organisation of Theme sessions.

Summary of the Work Plan

Year 1	At the moment, all the suggested ToRs are planned as three-years activities covering the entire extension period. Certainly, a various workload intensity in specific ToRs in each year is expected.
Year 2	At the moment, all the suggested ToRs are planned as three-years activities covering the entire extension period. Certainly, a various workload intensity in specific ToRs in each year is expected.
Year 3	At the moment, all the suggested ToRs are planned as three-years activities covering the entire extension period. Certainly, a various workload intensity in specific ToRs in each year is expected.

Supporting information

Priority	The activities of this group are a basic element of the EPDSG, fundamental to understanding the relation between the physical, chemical environment and living marine resources in an ecosystem context. Reflecting the central role of zooplankton in marine ecology, the group members bring a wide range of experienced expertise and enthusiasm to bear on questions central to ICES concerns. Thus the work of this group must be considered of very high priority and central to ecosystem approaches.
Resource requirements	Resource required to undertake the "normal" activities of this group is negligible.
Participants	The Group is normally attended by some 25–30 members and chair-invited members.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The Group reports to the SCICOM EPDSG. Mainly WGZE provides scientific information on plankton and ecosystems but irregularly contributing to the advisory part of ICES activities as well.
Linkages to other committees or groups	Any and all expert groups interested in marine ecosystem monitoring and assessments, modelling and/or plankton studies, including fish and shellfish life histories and recruitment studies. Close cooperation with the WGPME and WGIMT is planned and expected.

Linkages to other organizations	The Plankton Status Report is of interest and practical use to a range of interested groups within ICES, PICES, CIESM, and GOOS with other national and international research groups and agencies. Exchange of information and cooperation is expected with other organisations as IOC, SCOR, COML/CMarZ, and others which have research activities meetings etc., of interest and relevant to the activities of the WGZE. Contacts are maintained through networking and collaborative activities.