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| Year | Author | Title | Notes | Cited in |
| 2011 | Hobday | Defining dynamic pelagic habitats | Key variables: bathy, SST, T250m, surface chl (seaWiFs), nitrate climatology.  Species associated with particular water masses.  Seven persistent habitats identified with cluster analyses based on 5 vars.  Related to species distributions (stable isotope?) | Suthers Editorial 2011 |
| 2001 | Young | Yellowfin tuna aggregations | Diatoms – Tuna.  Tuna attracted to upwelling from eddy | Suthers Editorial 2011 |
| 2005 | Cai | The response of … EAC … to global warming | Warming and strengthening of EAC | Suthers Editorial 2011 |
| 2015 | Andersen | Theoretical foundation of SSM | Review of SSM | Blanchard 2017 |
| 1977 | Sheldon | Structure of pelagic food chain | Review of SSM | Blanchard 2017 |
| 2017 | Blanchard | From Bacteria to whales | Review of SSM | Iain recommendation |
| 2015 | Lefort | Spatial and body size dependent response of marine pelagic communities | SSM to examine spatial distributions and abundance | Blanchard 2017 (6) |
| 2016 | Jacobsen | Efficacy of fisheries is increasing | SSM to examine consequences of anthropogenic and environmental change | Blanchard 2017 (68) |
| 2014 | Jacobsen | The consequences of balanced harvesting | SSM to examine consequences of anthropogenic and environmental change | Blanchard 2017 (71) |
| 2012 | Blanchard | Potential consequences of climate change for primary production | SSM to examine consequences of anthropogenic and environmental change | Blanchard 2017 (72) |
| 2012 | **Schaeffer** | Cross-Shelf Dynamics | The cross-shelf dynamics up- and downstream of the separation  two years of high-resolution velocity and temperature measurements from mooring arrays. The mean cross-shelf circulation is weakly onshore at both sites, with warmer water close to the shelf break, consistent with the encroachment of the warm EAC or a WCE.  The major implication of cross-shelf flows is the uplift of cold and nutrient rich water. Onshore bottom flow brings cold slope water onto the shelf.  The strong uplifts are expected to have significant impacts on the biology as these water masses are very rich in nutrients. |  |
| 2018 | Oliver | Longer and more frequent marine heatwaves over the past century | Longer and more frequent marine heatwaves over the past century |  |
| 2016 | Kerry | ROMS |  |  |
| 2018 | White | Zooplankton distribution and size spectra | * 39 tows of Optical Plankton Counter (OPC) from 2004 – 2016 * Total biomass * Abundance * geometric mean size * normalised biomass size spectrum (NBSS) slope and intercept * driven by the environmental variables - sea surface temperature (SST), Chlorophyll-*a* biomass, sea level anomaly (SLA) and bathymetry * Biomass dominated by copepods (80,000 spp.) and krill (80 spp.) * copepods, euphausiids, hyperiid amphipods, pteropods, chaetognaths, salps * particles occur in roughly equal amounts in logarithmically equal size class bins * As metabolic rate and biological rates are a function of size, sized based ecosystems are a simplified way of calculating the energy dynamics of an ecosystem. * Predation and temperature (production) alter the slope of the size spectra curve. * The size spectrum is a balance between gains in energy through growth and losses of energy though respiration and predation/mortality in a size based community. Therefore changes in slope between times or environments can be used to assess the energy transfer efficiency among environments. Slope, biomass and intercept of a spectrum are therefore affected by production and predation in an environment, and growth and respiration rates, trophic dynamics and energy transfer efficiency of the zooplankton in a community. * Coastal to offshore gradients often exhibit higher productivity and zooplankton biomass near the coast (Vandromme et al. 2014) and low biomass and lower slopes in open ocean conditions (Marcolin et al. 2015). * Initially an increase in primary productivity creates a dome of increased biomass in the size class relating to phytoplankton. Through predation of the phytoplankton by higher trophic levels, this dome appears as a travelling wave, through the smaller to larger size classes over time. * A biomass size frequency distribution is usually converted to a NBSS, by dividing the biomass of each size category by the width or range of each size category with units of m-3. * A log-log plot of normalised biomass on size creates a negative relationship, as biomass in the natural world is approximately distributed logarithmically. * The NBSS has various statistics to convey the zooplankton biomass and productivity. * The NBSS slope (NBSSslope) essentially indicates the biomass ratio of larger sized organisms to smaller sized organisms, indicating a community’s growth, respiration, mortality and trophic dynamics. * Energy preserved as body mass results in higher efficiency of energy/biomass transfer through the food chain resulting in a less negative NBSSslope, whereas high loss of energy from primary to secondary producers results in steeper NBSS slopes. * Environments with higher temperatures and therefore higher metabolic demands result in increased energy loss and steeper NBSS slopes * The LED-OPC (OPC) has only 6 LEDs and can resolve particles 0.25 to 20 mm ESD whereas the Laser-OPC (LOPC) has a row of 70 1 x 1 mm detectors and can resolve particles 0.1 to 35 mm, at a 1000 fold greater concentration. * The LOPC measures particles of 100-1500 µm as Single Element Particles (SEPS’s) and 1500 µm-35000 µm as Multiple Element Particles (MEP’s) which can convey some understanding of shape or even translucence profile (I.e. 0.1- 35 mm). * The EAC harbours tropical zooplankton assemblages and there is an increase in the size spectrum slope of 30% between the Coral Sea (approx. -1) (-0.95 to -1.3) (Suthers et al. 2006)) and Tasman Sea (-0.59 to -0.8). The cooler Tasman Sea supports a higher biomass of phytoplankton, with larger phytoplankton cells and a higher biomass and proportion of larger size classes of zooplankton than the EAC. * In summary, zooplankton are a food resource to fish, and biomass and NBSS intercept of the zooplankton size spectrum are ultimately an indicator of the availability of zooplankton to support the biomass of fish. Zooplankton biomass is determined by the richness of the supply of phytoplankton or lower trophic resources as a food resource to support zooplankton. A greater biomass of phytoplankton results in a greater biomass of zooplankton, seen as a higher intercept in the NBSS. The mediating factors that determine the proportion of primary production that translates into zooplankton biomass, are related to temperature, and the properties of the zooplankton size structure. * Sea level anomaly is used to identify cold and warm core eddies, which can entrain zooplankton populations and often harbour different physical and biological properties to the surrounding environment. Bathymetry may affect zooplankton communities, through upwelling and sea floor mixing processes adding nutrients to the water column and enriching primary production at the shelf break and on the shelf. * All the voyages were conducted during the austral spring * At a basic level, the size spectrum reveals how abundance (or biomass) of a community varies with body size * Size spectra are generally described by the relationship between the logarithm of total body mass (or abundance) binned to body mass classes. * where the slope is approximately -1, as first proposed by Sheldon et al. (1972) to hold from bacteria to whales. There is of course much variability around this -1 approximation . * Non-linear patterns are also seen within the size-spectra and generally result from either short–term perturbations of the community from nutrient inputs or the bloom of a single-species (Mullaney and Suthers 2013) or from longer-term patterns such as seasonality (Jennings 2005), limits of sampling gear (Krupica et al. 2012) or inefficiencies in the predator-prey relationship in the size-ranges related to a switch in taxa (i.e. phytoplankton-zooplankton or zooplankton-fish; (Kerr and Dickie 2001; Blanchard et al. 2017)). * Nonetheless, the linear size-spectrum is a powerful tool for understanding predator-prey relationships and energy transfer within the food-web. * Mean phytoplankton biomass and cell size increases with decreasing temperature and increasing chlorophyll-*a.* * Without understanding how the zooplankton size-spectrum mediates the food-web, we are neglecting a significant factor in how energy is transferred from phytoplankton to fish. Understanding how the size-spectra of zooplankton change with environmental conditions is the first step in this process, and will help to bridge the gap between the phytoplankton and fish community size structure. * The zooplankton size-spectra of the oligotrophic Coral Sea and EAC waters are generally very linear and vary between -0.87 and -1.14 (Rissik et al. 1997; Suthers et al. 2006; Baird et al. 2008). Conversely, the Tasman Sea generally displays a flatter slope of between -0.59 and -0.78 (Baird et al. 2008). * Data was collected using an OPC mounted on a modified SeaSoar (2004, 2006, 2008) and a Laser OPC (LOPC) mounted on the Triaxus (2015, 2016). * Each pair of up/down casts were separately analysed as an independent sample. * In this analysis, only the 5 - 30 m is included. This is to ensure the data analysed is within the surface mixed layer (Baird et al. 2008, 2011) and corresponds with remotely sensed observations. * Zooplankton Biomass (mg m-3), Zooplankton Abundance (ind. m-3), GMS (ESD; μm), and the NBSSslope and NBSSintercept of the NBSS * Biomass was calculated using the volume equation of a prolate spheroid (size ratio of 3:1) and a specific gravity of 1 (Moore and Suthers 2006). The summed biomass for each net tow was standardised by the processed volume. * It is important to note that the data collected by the OPC does not distinguish between living zooplankton and debris, aggregates or zooplankton carcasses. Most detrital particles are smaller than the 300 µm lower size limit that is used in this study. Up to 30% of copepod nauplii may consist of carcasses (Elliott and Tang 2011) but these stages are also smaller than this studies lower size limit. However, the NBSS constructed from this data may still include some larger detrital or moribund zooplankton artefacts. * The study area was divided into watermasses defined by the satellite sea surface temperature, bathymetry and location (Fig. 2.2, Table 2.2) of the data points, following previous Tasman Sea work. * DIDN’T USE INSITU DATA IN MODELS. * Tricky with predictions I.e. sat data are SURFACE, so only the upper 30 m of OPC data were used * SIMPLE LINEAR MODELS * USE SOPHIE’S APPROACH! * Why no effect plots with enviro variables? * Ill bring this closer to the shelf? * Compared to the EAC, the Tasman Sea had significantly higher mean zooplankton abundance (2884 ind. m-3, 6166 ind. m-3 respectively), higher mean biomass (244 mg m-3, 1318 mg m-3 respectively), larger mean GMS (441 [Symbol]m, 525 [Symbol]mrespectively), shallower mean NBSSslope (-0.985, -0.774 respectively) and higher mean NBSSintercept (1.3, 2.00 respectively) (Fig. 2.3, Appendix A Table 1-5). In addition, the southern shelf had significantly higher zooplankton abundance, biomass, and GMS compared to the northern shelf, as well as a shallower NBSSslope and higher NBSSintercept (Fig. 2.3). * he greater nutrient concentrations and phytoplankton biomass in the Tasman Sea (Everett et al. 2014) support a higher biomass of zooplankton, as well as larger mean zooplankton size. * It was expected that the upwelling of nutrient-rich water and higher chlorophyll-*a* biomass on the shelf relative to offshore (Young et al. 1996; Everett et al. 2014; Vandromme et al. 2014), would have resulted in a higher biomass of zooplankton. It is likely however, that the degree of mixing between the shelf and offshore due to wind, currents and eddies (Everett et al. 2012; Schaeffer et al. 2013; Wood 2014), occurs at a timescale which is shorter than the response (generation) time of zooplankton. * Steeper slopes may occur initially in environments with intermittent bursts of productivity such as estuaries (Moore and Suthers 2006) or upwelling zones (Piontkovski et al. 1995) as small herbivorous zooplankton proliferate, but the slope generally flattens as the energy is transferred to larger size classes and productivity of the lower trophic levels returns to the baseline. * The NBSSslope can be used to determine the energy transfer efficiency through the size spectrum. Steeper slopes, such as we observed in the EAC, indicate a higher loss of energy and the inability for the energy to transfer to larger size classes (Blanchard et al. 2009). * Zooplankton can have multiple feeding strategies, but when primary production is low, such as in the EAC or other oligotrophic regions, carnivory is usually the dominant strategy. Therefore smaller predator prey mass ratios (PPMR) and longer food chains with more trophic levels are characteristic. * In contrast, more productive regions such as the Tasman Sea, are characterised by flatter slopes, larger PPMR and shorter food chains. * The incorporation of chlorophyll- *a* as the food source is simplistic, as zooplankton can acquire their energy requirements from other pathways such as from the detrital foodweb. * Due to the technical considerations of the range of instruments required, phytoplankton and zooplankton size-spectra are rarely measured simultaneously. * Chapter3: assess whether annual changes in zooplankton temporal and spatial distribution have occurred during the period of satellite data availability. only the upper 30 m of OPC data were used. * Variability of the zooplankton size-spectrum was expected to be higher on the continental shelf, compared to the offshelf region, due to processes such as sporadic upwelling which intermittently bring cooler nutrient rich waters to the surface (Roughan & Middleton 2002) increasing the production of the lower trophic levels (Everett et al. 2014). * As the EAC strengthens (Wu et al. 2012) and the EAC separation zone moves south (Cetina-Heredia et al. 2014), there is a decline in phytoplankton biomass (Johnson et al. 2011). * It is not surprising that with the intrusion of warmer Coral Sea waters into the Tasman Sea, there is a decline in zooplankton abundance, biomass and GMS, and therefore a steepening of the NBSSslope. * The concern for regional fisheries managers, is that the decline in zooplankton availability will have flow on effects into the resources available to sustain fisheries of the region. There is speculation that as the EAC intensifies, more frequent / stronger upwelling events may occur along the continental shelf, thereby enhancing primary production and increasing overall productivity of the area (Everett et al. 2014). Unfortunately, the temporal resolution of this study is too broad to resolve finer scale details such as localised upwelling. Whether more frequent upwelling events will occur, or occur at a scale that outweighs the influence of the southward penetration of the lower productivity Coral Sea waters, is as yet unknown. * A flatter NBSSslope indicates a shorter food chain length from prey to predator, increased energy transfer efficiency (Jennings and Collingridge 2015; Heneghan et al. 2016; Stock et al. 2017) and more herbivorous feeding strategies (Stock et al. 2017). Omnivorous zooplankton in the Tasman Sea can change their feeding strategy to become more carnivorous when chlorophyll-*a* in an environment is low (Henschke et al. 2015). This implies that the zooplankton communities in the Coral Sea waters may have a more carnivorous feeding strategy than the Tasman Sea. * The oligotrophic Coral Sea waters are low in nutrients and chlorophyll-*a* (Suthers et al. 2006). This is also reflected in the zooplankton communities which had low abundance, low biomass, low GMS, and steeper, more negative NBSS slopes. * The Tasman Sea showed higher abundances, biomass, GMS, flatter (less negative) NBSS slopes and higher NBSS intercepts. This agrees with previous research, showing the Tasman as highly productive. * The two dominant water masses in the study area are the Tasman Sea and the Coral Sea. Each has its own zooplankton community characteristics, with differences in species, trophic dynamics, size spectrum and productivity. * Climate change is driving a greater mass of Coral Sea water further southward, and this is reflected in our results as a change in springtime zooplankton community size spectra and a decline in zooplankton biomass of the study area during the study period of 2003 to 2016. The decline in zooplankton biomass is likely to be from the water mass shift of oligotrophic, warm Coral Sea water with its associated smaller GMS and less productive zooplankton communities. |  |
|  | **Moore & Suthers 2006** | In thesis | Theoretical influences on SS |  |
|  | (Suthers et al. 2006) | In thesis | Linearity, or the coefficient of determination (r2), of the NBSSslope is an indicator of the stability and productivity of an ecosystem. In stable watermasses, such as pelagic or offshore environments, linear slopes fitted to the NBSS have greater r2 values indicating less variation around the linear fit of the NBSSslope. Less stable environments such as inland lakes have greater secondary structuring around the linear NBSSslope, therefore lowering the r2 value of the linear fit |  |
| 2009 | Blanchard | How does abundance scale with body size in coupled  size-structured food webs? | the aggregation of particles of all types into a  single size spectrum can oversimplify the structure of the food  web if different components of the ecosystem have different  feeding characteristics. For instance, a slope of about –0·75,  rather than around –1, has been suggested for organisms of  different sizes which share a resource rather than eating one  another, and slopes shallower than –0·75 have been reported  in the unusual case when larger animals feed at lower trophic  levels (Maxwell & Jennings 2006). Clearly, the slope obtained  after aggregating such different spectra would be hard to  Interpret. The need for disaggregation is especially evident in shelf  seas where predators in the pelagic zone feed primarily  according to body size and yet many benthic animals share  common resources such as detritus or phytoplankton  irrespective of their body size.  Here we describe the relationships between two trophic  pathways in size-structured communities: one comprised of  predators feeding on each other according to body size  (dominated by mobile fish and predatory invertebrates, mostly  in the water column) and the other comprised of animals  sharing food (dominated by filter-feeding and depositfeeding  macrobenthic invertebrates). |  |
| 2014 | Blanchard | Evaluating targets and trade-offs among fisheries and  conservation objectives using a multispecies size  spectrum model | We develop, calibrate and apply a multispecies size spectrum model of the North Sea fish community to assess the response of populations and the community to fishing. The model predicts species’ size distributions, abundance, productivity and interactions and therefore provides a single framework for evaluating trade-offs between population status, community and food web structure, biodiversity and fisheries yield. |  |
| 2005 | Cai | The response of the Southern Annular Mode, the East Australian  Current, and the southern mid-latitude ocean circulation to global  warming |  |  |
| 2016 | Canales | Shifts in plankton size spectra modulate growth and coexistence of anchovy and sardine in upwelling systems | * Using a dynamical multispecies size-spectrum model, we explore the consequences of changes in plankton size composition, together with intraguild predationand cannibalism, on the coexistence of these species. The shift towards smaller plankton has led to a reduction in the growth rateof both species. The effect was more deleterious on anchovy growth because it is unable to filter small particles. In modelscenarios that included the effects of cannibalism and predation, anchovy typically collapsed under conditions favouring smaller sized plankton. * We show that differences in the plankton size spectrum canhave major consequences for the growth and coexistence of sardineand anchovy using simplified equilibrium scenarios from adynamical multispecies size-spectrum model. * Numerical results from our size-spectrum model suggest that   the change in the plankton spectrum has effects that percolate through the pelagic food web due to differences in the feeding apparatus of the two main planktivores, anchovy and sardine (vander Lingen et al. 2006, 2009). The feeding morphology of sardine allows it to extract particles with masses smaller than anchovy and, therefore, to feed more on the small plankton. |  |
| 2014 | Everett | Relative impact of seasonal and oceanographic drivers on surface chlorophyll a along a Western Boundary Current | Strengthening Western Boundary Currents (WBCs) advect warm, low nutrient waters into temperate latitudes,  displacing more productive waters.  We interpreted a spatial and temporal analysis of satellite-derived surface Chl. a, using a hydrodynamic model, a wind-reanalysis product and an altimetry-derived eddy-census.  The interaction of wind and the EAC was a critical driver of surface Chl. a dynamics, with upwelling-favourable sW resulting in a 70% increase in surface Chl. a at some locations  These patterns of phytoplankton biomass show contrasting temporal dynamics north and south of the central EAC separation zone with more episodic upwelling-driven Chl. a anomalies to the north, compared with regular annual spring bloom dynamics to the south.  WBCs are often thought of as unproductive relative  to Eastern Boundary Currents, however they drive upwelling of  nutrient rich water and generate eddies and thus support some  of the most productive habitats in the world’s oceans.  The EAC can encroach  onto the shelf and displace continental shelf waters, drive  upwelling of nutrient rich waters into the euphotic zone and generate  eddies. EAC flow varies seasonally (Ridgway and Godfrey,  1997), but upwelling is generally persistent in the region south  of Cape Byron (28.5S; Oke and Middleton, 2000) and Smoky Cape  (31S; Roughan and Middleton, 2002) where the shelf narrows and  the EAC exhibits its greatest speeds (Fig. 1).  To the north of the separation  zone, oligotrophic EAC water mixes with upwelled water, while  the south is dominated by Tasman Sea water  EAC coastal eddies can drive nutrient rich slope water  up onto the continental shelf (Tranter et al., 1986) and generate  upwelling in their centre  Bottom stress (sb) and wind stress (sw) are measures of the  force acting on the bottom and surface of the ocean respectively. When acting in an alongshore direction, these shear stresses act  to move water towards or away from the coast, in turn driving  downwelling or upwelling respectively.  The effect of eddy encroachment on the sB of the continental  shelf edge are apparent with anticyclonic eddies often strengthening  the upwelling conditions, and cyclonic eddies weakening or  reversing the upwelling effect of the EAC flow.  Stockton Bight is a biologically  important area, with elevated nitrate (Suthers et al., 2011) and  persistently high abundances of white sharks (Reid et al.,  2011). Over the period of this study, Stockton Bight contained  P20% of the total shelf Chl. a on 27% of occasions, highlighting  its significance to the trophic ecology of the continental shelf. Additionally, the enriched shelf waters are often entrained into  frontal cyclonic eddies which are generated by the EAC near  Stockton Bight (Everett et al., 2011). These enriched eddies  may act as incubators of zooplankton and larval fish  Weaker upwelling events will also influence phytoplankton biomass  at depth but were not quantified in this study. Measurements  of subsurface Chl. a are necessary to fully describe the biological  impact of upwelling events, however these measurements are less  common and generally associated with infrequent research voyages  within the region.  The EAC region has the second fastest warming trend of all  WBCs (Wu et al., 2012), with cascading changes to ecological communities  such as zooplankton populations and kelp beds already  apparent (Johnson et al., 2011).  As the EAC intensifies, patterns of  upwelling and eddy generation are likely to change, but it is still  unclear what the consequences of this are for ecosystem productivity |  |
| 2012 | Everett | An avenue of eddies: Quantifying the biophysical properties  of mesoscale eddies in the Tasman Sea | We find that Eddy Avenue cyclonic and anticyclonic  eddies have more strongly differentiated biological  properties than those of the broader Tasman Sea, as a result of  larger anticyclonic eddies formed from Coral Sea water  depressing chl. a concentrations, and for coastal cyclonic  eddies due to the entrainment of nutrient-rich shelf waters.  Cyclonic eddies within Eddy Avenue have almost double  the chlorophyll a (0.35 mg m3) of anticyclonic eddies  (0.18 mg m3).  With a strengthening East Australian Current, the  propagation of these eddies will have significant implications  for heat transport and the entrainment and connectivity of  plankton and larval fish populations.  In this study we quantify the remotely-sensed sea surface  temperature (SST) and chlorophyll a (chl. a) of eddies in  the Tasman Sea, and then in an eddy-rich region in the  western Tasman Sea we hereafter refer to as ‘Eddy Avenue’.  Due to  the filtering of the SSH fields, eddies of radii <40 km are  generally not resolvable.  The results presented here show that  frontal eddies associated with boundary currents can have significant implications for local fisheries by  entraining enriched shelf water and providing additional nearshore habitat for growth and survival. |  |
| 2016 | Heneghan | Zooplankton are not fish | Ourresultsillustratethatzooplanktonarenotjustastaticfoodsourceforlargerorganisms, norcantheyberesolvedasverysmallfish.Theuniquefeedingcharacteristicsofzooplanktonhaveenormousimplicationsforthedynamicsofmarineecosystems,andtheirrepresentationisofcriticalimportanceinsize-spectrummodels,andend-to-endecosystemmodelsmorebroadly. |  |
| IN2016\_V04 | NA | RV Investigator Voyage Summary | We sought to understand trophic linkages by coordinating microbial sampling with observations and samples of higher trophic levels. Zooplankton and larval fish were targeted with net sampling, Laser Optical Plankton Counter (LOPC) measurements on the Triaxus and the ship’s EK60 multibeam echosounder (particularly 38 kHz that targets fish swim bladders and 70 kHz that targets gelatinous zooplankton).  In addition to understanding the impact of mesoscale and frontal eddies on the development of larval fish, the southern NSW region near Montague Island became a focal point for trophic investigations, not only because it is an area of high biological significance (seal colony, penguin breeding ground), but also because an emerging research direction is to understand how the biological oceanography in this region influences the marine foodweb (see Carroll et al. 2016 Scientific Reports. 6:22236; doi:10.1038/srep22236).  The foodweb team had three main goals:  1) To assess the growth and mortality of larval fish between the shelf and coastal waters to test the novel hypothesis that the offshore waters including frontal eddies of the EAC are a nursery ground for commercial fish;  2) To quantify the diel vertical migration and “carbon pump” of zooplankton down to 500 m depth, in northern and southern waters of the western Tasman Sea; and  3) To opportunistically sample larval lobster (phyllosoma).  Nearly 25 shallow EZ net tows (to 50 m deep to achieve goal 1) and 50 neuston tows were completed, finding many larval sardine (Sardinops sagax), mackerel (Scomber australasicus) and scad (Trachurus novaezelandiae).  A surprising finding was the abundance of green slime in the nets (tentatively identified as Thallasiosira sp.) at 36 °S off Montague Island (Figure 9). This was an extensive bloom that stretched from coastal inshore waters to 200 nm eastward in the Tasman Sea and completely dominated the plankton (zooplankton and larval fish abundance was very low).  In comparison, there was relatively high abundance of zooplankton and larval fish in the Sydney eddy, with some green slime; compared to the low abundance of phytoplankton and zooplankton off the Gold Coast at 28 °S. The western Tasman front (Mullaney & Suthers 2011) off Sydney is indeed a productive nursey area, downstream of the EAC separation zone.  The Triaxus enabled collection of zooplankton abundance, biomass and size spectra data (alongside CTD, fluorescence, oxygen) across different water masses. A total of 11 deployments (with the LOPC) were conducted and provided excellent coverage from the surface to ~200 m.    The ship’s echosounder was also used to examine fish and zooplankton distributions. Interestingly, we observed a gradient of fish abundance i  n the EK60 data north and south of Montague Island that provides a useful starting point for examining fish abundance across other spatial or oceanographic gradients (Figure 11). |  |
| 2017 | Schaeffer | MHW | Extreme temperatures at depth are driven by local  downwelling favorable winds that mix the water column and reduce the stratification. These results show  the importance of considering subsurface hydrography and that sea surface temperature is insufficient to  fully understand MHWs which are having disastrous ecological consequences in coastal regions globally  In addition to changes in regional oceanography [e.g.,  Oliver et al.  , 2014], we show that understanding how  coastal wind forcing may change in the future is of great importance for MHWs.  While  satellite SST is incontestably a very valuable tool for studying large-scale temperature extremes, we showed  that the surface information does not represent the deeper signature of MHWs. |  |
| 2012 | Kloser | Species identification in deep water using multiple acoustic frequencies | Trawl sampling is traditionally used to allocate species compositions to the acoustic records in mixed-species situations. Net sampling has potential biases such as variable catchability between species and spatial and temporal extrapolation of patchy demersal and pelagic trawls  Multiple frequency acoustic methods have been used to distinguish species or groups of zooplankton and discriminate between fish and zooplankton |  |
| 2015 | Champion | Zooplanktivory is a key process for fish production  on a coastal artificial reef | this study showed that the trophic  link between zooplankton and zooplanktivorous fishes  is an important avenue of energy for reef assemblages,  and one that probably contributes much to  fish production on coastal artificial reefs.  This study  also revealed the trade-off between food supply and  habitat supply as reef size changes and that food  limitation is probably a key process driving resident  zooplanktivore production on larger reefs.  Reef associated planktivors - Trachurus novaezelandiae and Atypichthys strigatus.  consumption of zooplankton by reef-associated  fishes and invertebrates forms a ‘pelagic pathway’ of  energy to artificial and natural reefs alike |  |
| 2017 | Truong | Plankton supports the majority of fish biomass on temperate  rocky reefs | In Australia, these reefs cover more  than 8000 km of temperate coastline, and this ‘Great Southern  Reef’ has great ecological and economic value.  the ‘pelagic pathway’ (i.e.,  plankton) may be a dominant primary source of energy for  reef fish assemblages  Planktivorous fish typically dominated reef fish  assemblages, comprising an average of 41% of the total fish  Biomass. Our food  web analysis showed that, on average, 56% (±5% s.e.) of the total fish biomass was ultimately supported by phytoplankton  (and 53% from zooplankton),  Our findings demonstrate the importance  of understanding the coastal dynamics of plankton  and planktivory for predicting the response of temperate  reefs and their fish assemblages to a changing climate. |  |
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