

Review of bg-2017-411

General comments

Overall the manuscript is well written and the concepts discussed are interesting. The approach is not novel; papers have been written on the community structure and stable isotope characters of these species previously. However, the extension of this work to the concept of a 'trophic network' through linkages to biomass has not been done in this location previously and the perspectives it provides are interesting. Some areas of the manuscript require clarification and there are questions about some aspects of the approach. I couldn't find the tables referenced in the manuscript: some of my concerns may be addressed by being able to evaluate these.

Specific comments

- Species list and abundances don't seem to be provided, although they are mentioned as being in Table 2. These should be made available, at least in supplementary format. Species list provision is particularly important for this study as all the samples were collected within the Endeavour Hydrothermal Vents Marine Protected Area (EHV MPA); species occurrence data would be very useful to the managing authority Department of Fisheries and Oceans (DFO). No mention of EHV MPA is made within the manuscript.
- "36 macrofaunal taxa were identified to the species level" (line 33); "35 macrofaunal taxonomic groups" (line 287 & 367): which is it - 36 species, or 35 taxa? Please clarify.
- Line 37: "fairly long tubes". Please define, how long?
- Lines 98 – 101: limited behavioural observations and gut contents analyses, compared to wide use of stable isotopes. For JdFR vents, there are many observations on behaviour, especially feeding, and some on gut contents, in the original species descriptions. True, there are few studies specifically addressing feeding behaviour or gut contents, compared to dedicated stable isotope studies. However, stable isotopes are just one of many tools to evaluate feeding, and like other techniques, stable isotopes have their limitations. It would be helpful to have a few sentences acknowledging the pros & cons of stable isotopes compared to other techniques available to assess feeding and trophic structure.
- Line 115: "despite the relatively low diversity of the deep-sea community" - do you mean low diversity of the hydrothermal community? Lines 63-64: "[hydrothermal vent communities have] low species diversity compared with adjacent deep-sea and coastal benthic communities". Please clarify.
- Line 122: Urcuyo *et al.* 2003. This is not the first reference to *Ridgeia piscesae* populations along the JdFR; please consider replacing or supplementing with an earlier reference. For example, the Revision of *Ridgeia* was published by Southward *et al.* in 1995; records of *Ridgeia* along the JdFR will extend to before this reference. "Southward *et al.* (1995) Revision of the species of *Ridgeia* from northeast Pacific hydrothermal vents, with a redescription of *Ridgeia piscesae* Jones (Pogonophora: Obturata = Vestimentifera. *Canadian Journal of Zoology*. 73: 282-295.
- Line 153: Lelievre *et al.* 2017. There is an earlier study on tidal influence on *R. piscesae* that was not referenced in Lelievre *et al.* 2017 and should probably be referenced here: Johnson & Tunnicliffe (1985) Time-series measurements of hydrothermal activity on northern Juan de Fuca Ridge. *Geophysical Research Letters* 12: 10, 685-688.

- Line 177: “intense”. Intense in terms of what? This could probably be removed so the sentence reads “The MEF... is the most active of the five hydrothermal fields...”
- Line 183: “Like many other MEF hydrothermal edifices...” This only has one reference, Sarrazin *et al.* 1997. This reference only characterises one hydrothermal structure, S & M. You need more references here to support the ‘many’ in your sentence; Govenar *et al.* 2002, Bergquist *et al.* 2007 and Urcuyo *et al.* 2007 are all possible additions. The latter is not in your reference list: Urcuyo *et al.* (2007) Growth and longevity of the tubeworm *Ridgeia piscesae* in the variable diffuse flow habitats of the Juan de Fuca Ridge. *Marine Ecology Progress Series* 344: 143-157.
- Lines 203-206: macrofauna and meiofauna sampling. If macrofaunal specimens are “>250 um” and meiofauna are “<63 um” then what are the fauna that are <250 um but > 63 um? The definition of macrofauna is variable, but 250 um is on the smaller end. 0.5 mm or 1 mm sieves are more common for macrofauna retention. Meiofauna would usually be considered to be 63 um – 0.5 mm: <63 um would be microfauna.
- Lines 209-212: trophic guilds. If trophic guilds were assigned to species prior to your stable isotope analysis, there needs to be a table detailing which species were assigned to different guilds, preferably with the reference(s) used for the designation and an indication if species level of higher was available. From the way this is written in the methods, it almost sounds like a circular argument: literature was used to assign trophic guilds (which will mostly contain stable isotope information) and then stable isotopes were used to assess the validity of these groups. There needs to be more detail here as to how the ‘trophic guild’ information was obtained and how it was applied.
- Line 215-222: density of individuals per m⁻². This is presumably based on the surface area of the sulphide chimney the tubeworms were attached to. But it is not really the surface area for the fauna – that would be the tubeworm surface area. I would be very cautious about using ind. m⁻² based on the chimney area sampled. Equally, as the basis for ind. m⁻³ I would be cautious. I appreciate this volume takes into consideration average tubeworm length, but it doesn’t take any account the width of the tubes or how twisted and intermeshed they are, which all contribute to the habitat area the tubeworms provide. Tsurumi and Tunnicliffe (2001), Tsurumi and Tunnicliffe (2003) & Marcus and Tunnicliffe (2009) all use tubeworm area standardised abundances for this reason.
- Lines 223-226: biomass estimates. I find these lines a little unclear... for the total dry mass of each species, did you dry all individuals of those species? Did you just dry the 3 – 10 individuals that you had randomly selected? If just the selected individuals, were these dried separately or together? What do you mean by “absolute biomass of each species was calculated by multiplying the relative biomass by the abundance of each species”? Did you take the mean weight of your randomly selected individuals and multiply this by your abundance? Please provide some clarification on the biomass estimates section.
- Lines 230-231: gut content. I’m not clear what you mean here by “in the case of intermediate-sized specimens, the gut content was removed”. Does this mean you did the stable isotope analysis on the whole individual, minus its gut? Or that you did the stable isotope work on the gut contents? Please clarify.
- Lines 265-266: sample volume as a proxy for habitat complexity. I am not entirely convinced by this, the long tubeworms seen at very low flow sites would provide a larger ‘volume’ by your definition, but their straight stiff tubes do not interlock in the same complex structure

that intermediate flow tubes or even some high flow tubes do. I.e., shorter tubes may make for a smaller volume but it doesn't necessarily make for reduced habitat complexity. Southward and Tunnicliffe 1995, Tsurumi and Tunnicliffe (2003) & Tunnicliffe *et al.* 2014 discuss the phenotypic complexity of *R. piscesae* in terms of tube structure and the implications this has for faunal communities.

- Line 293: densities in m^{-3} . These numbers are incredibly large and speak to my point about tubeworm surface area... what does the number of individuals per m^{-3} really mean for benthic organisms? Most of these species will be attached to substrata, i.e. the tubeworms, so that tubeworm surface area, measured in cm^{-2} (as in Tsurumi and Tunnicliffe 2001) would probably be more relevant on a habitat scale than m^{-3} .
- Lines 286-299: macrofaunal densities. I presume these densities exclude *R. piscesae* abundance?
- Line 315: acarida. *Copidognathus papillatus* is in the class 'Arachnida', subclass 'Acari'.... Family 'Halacaridae'. I'm not sure where 'acarida' comes from but it is not an accepted taxonomic name in the World Register of Marine Species (WORMS): <http://www.marinespecies.org>
- Lines 350-351: "With a biomass ranging from..." In this and subsequent sentences, I presume you are referring to the biomass ranges across all samples at Grotto? Could you please clarify this in the text?
- Lines 361-362: feeding guilds. See previous comment on how trophic guilds were assigned and applied. I am unclear here whether the discussion of biomass and guild relationships refers to guilds applied to taxa using the literature (including previous stable isotope studies) or whether the authors have re-assigned guilds from their own stable isotope data. A table with the species and guilds assigned using the literature, with an additional column indicating whether the present study agrees with these designations would be helpful.
- Line 390: "a pattern that has also..." I presume here you mean the pattern of dominance by a few species? This is worth clarifying, as it could be misread that the dominance of *L. fucensis*, *D. globulus*, *A. carldarei* specifically is the pattern you are referring to. Consider breaking it into two sentences: "*R. piscesae* tubeworm assemblages sampled on the Grotto edifice were characterized by the dominance of a few species, such as *L. fucensis*, *D. globulus* and *A. carldarei*. Numerical dominance by a few species is a pattern that has also been observed from other hydrothermal sites on the world oceans..."
- Lines 400-401: sample size. How much smaller were the samples from 2016, in terms of surface area/volume? How much material (as an estimate) was lost during collection?
- Line 412: what do you mean by "a high level of complexity?" a complex tubeworm bush structure? This needs some clarification.
- Lines 413-416. With the limited information you have on the character of your tubeworms from each sample, I'm not convinced you have sufficient evidence for this statement. You haven't assessed the nature of the biogenic structure for your samples (i.e. the physical structure of your tubeworm bushes); you've calculated the potential volume of seawater your tubeworm bushes could occupy, which is not the same.
- Lines 429-430: why do your density ranges for *A. carldarei* exclude S4 and S6? If you're talking about the Grotto edifice as a whole, shouldn't these two samples be included?
- Line 430: High densities of what? *A. carldarei*? Please clarify in the text.

- Lines 430-431: "...may be related to the specificity of this family with high ecological tolerance and, therefore..." Specificity and tolerance are opposite ends of a spectrum, consider rephrasing to "...may be related to this ampharetid's tolerance to environmental conditions and, therefore..."
- Lines 441-442: "The grazing of new recruits may also limit species diversity" Do you mean the grazing action of new recruits to the community limits species diversity, or the grazing action of the community on new recruits limits species diversity? Please clarify.
- Lines 455-457: three pools of isotopically distinct microbial production. Do you think *L. fucensis* really feeds on its own separate pool of microbial production? Or does its contrasting isotopic signature reflect the fact that it may be utilising multiple microbial sources at any one time? As you mention later (lines 569-575), it can host bacteria on its gill filaments and eat them, along with grazing and suspension feeding activities. It might be worth introducing this concept here instead of the brief reference to Bates (2007) at line 485.
- Lines 461-462: "...species deriving their food sources from siboglinid tubeworms are rare." I don't quite agree here – there are multiple species that do eat *R. piscesae*, including *B. tunnicliffae* as you mention at line 469. *Buccinum thermophilum* also preys on *R. piscesae*. That the isotopic signatures don't closely match these predators to their prey doesn't mean that the predators are rare; instead it suggests the predators are not specialist, i.e. they eat more than just *R. piscesae*.
- Line 471: "Predation on tubeworms was confirmed..." Predation by whom? There are many images/video clips of *B. tunnicliffae* predating on *R. piscesae*; do you have imagery of *L. fucensis* doing the same? This sentence needs some clarification.
- Lines 480-482: "most vent species display an isotopic composition centred on *L. fucensis*" What do you mean by this? That most of the species have an isotopic composition similar to *L. fucensis*? Please clarify.
- Lines 483-487: the role of *L. fucensis*. Do you think that the wide-ranging feeding strategies of this limpet really exert pressure on the availability of resources for others? Or does the range of strategies open up more opportunities for *L. fucensis*, allowing them to take advantage of resources that others cannot? See you text at lines 569-575.
- Lines 487-490: *Paralvinella* species. These line are somewhat unclear, are all *Paralvinella* selective deposit feeders? Was the stable isotope composition more variable in terms of intraspecific variation or in terms of interspecific variation among samples?
- Line 494: "Grotto primary consumers were dominated by grazers and deposit feeders" Where is your evidence/data for this? A table of your trophic guild designations would be really useful to refer to here.
- Lines 500-501: *P. sulfincola* low nitrogen values. This sentence needs some clarification; the feeding behaviour of *P. sulfincola* can only explain the low nitrogen values for that species, not all *Paralvinella* species, as they may (and in fact do) display different feeding strategies.
- Line 508: "the comparatively small size of *P. pandorae*" How large are the *P. pandorae* in your samples compared to the size range of your other *Paralvinella* species?
- Lines 517-520: wide range of carbon values. Does this mean the carbon values provide less supporting evidence for your designated guilds than the nitrogen values? As phrased, it appears that you are choosing to go with the nitrogen data as it better fits your guild

concepts, despite the range in carbon... Please could you clarify? Again, having a table with your guild designations for each species, whether the carbon and nitrogen values from your study support these, and even how your values compare to other studies (e.g. Bergquist *et al.* 2007) would be really helpful. See Table 1 in Bergquist *et al.* 2007 for a starting point.

- Lines 521-529: These lines are unclear with respect to *L. kincaidi*. The high nitrogen values make it a “top predator”, but isotopic variability suggests it has “highly diversified food resources”. So it isn’t just a predator but also exhibits other feeding strategies? Please provide some clarification here, again a table of isotopic values by species and your guild designations (*cf* Bergquist *et al.* 2007) would be really useful for interpretation.
- Lines 539-541: How did your results overall compare to Bergquist *et al.* 2007? Did you get similar values and ranges for the same species? It would be helpful to compare your work to theirs here.
- Lines 561-566: gastropods. The group gastropoda is very large and the species you have; *D. globulus*, *P. variabilis* & *L. fucensis* come from completely different families, they are even in different sub-classes (Neomphalina, Caenogastropoda, Vetigastropoda respectively) so I’m not convinced the concept of “closely related” (line 560) in relation to these species and resource portioning is reasonable. They are not closely related; it is not so surprising that they have different feeding strategies and occupy different niches.
- Lines 588-589: *B. thermophilum* carbon signatures. This species has been observed preying on tube worms, could the higher carbon values support this and/or other predatory behaviours?
- Lines 596-598 & 611-613: I still have concerns that your characterisation of the tubeworm habitat is not sufficient to make this statement, see previous comments relating to tubeworm plasticity and habitat volume as a proxy.

Technical corrections

- Line 35 & 36: would read better if gastropods are listed first. See previous sentence.
- Lines 88 – 98: multiple occurrences of ‘e.g.’ and ‘etc.’; could these sentences be more specific?
- Line 172: Middle Valley isn’t really a site *per se*; it’s more of a seabed area and there are sites within it. Might just read better as ‘Middle Valley’ without ‘site’.
- Lines 174-175: would read better as “The five major vent fields – Sasquatch, Salty Dawg, High Rise, Main Endeavour Field (MEF) and Mothra – found along the Endeavour axial valley are each separated by 2-3 km.” Please note that MEF stands for Main Endeavour Field, not just Main Endeavour.
- Line 183: “a relative stability in years”: would read better as “but is relatively stable across years”
- Line 234: “About 1.3-1.4 mg of the powder was precisely measured” consider substituting ‘about’ for ‘approximately’.
- Line 268: Table 1. Where is Table 1? I can’t find it in the pdf. I also cannot find Table 2!
- Lines 279-280: the lowest diversity values. This sentence would read better if the lowest diversity values were listed first, in the order of increasing diversity values.
- Lines 301, 329 & 337: “more specifically”. You might consider an alternative start to these sentences, such as “In more detail”.

- Line 323: "...S6 was also dominated *L. fucensis*" should read "...S6 was ably dominated by *L. fucensis*"
- Line 384: "engineer polychaete" should probably read "ecosystem engineering polychaete"
- Lines 372-376. Consider rephrasing slightly to make it clear the reference is for all the species richness records. Alternative phrasing could put the reference at the start of the sentence: "Tsurumi and Tunnicliffe (2003) reported the presence of 39 macrofaunal species.... 19 species in 2 collections from the CoAxial Segment (JdFR)."
- Line 379: "engineer mussel beds: should probably read "ecosystem engineering mussel beds"
- Line 382: "worldwide hydrothermal ecosystems". In the context of this sentence, I think you mean biogeographic regions or provinces? Consider changing to "Faunal dissimilarities between biogeographic regions..."
- Lines 442-445: this sentence is to me unclear. Please consider re-phrasing/clarifying. Also note repeat Sarrazin *et al.* (2002) reference.