1 General answer

Author Response

Thank you for your great comments. Before I go into the individual comments in detail, I want to acknowledge a limitation in the paper that you flagged in several of your comments. This is related to the evaluation of the model output and the problem that the combining of data from various locations brings. This was done because, although data on Hg bioaccumulation can be found more often, studies measuring both MeHg and Trophic Level are less common. That being said, two big studies came out in 2024 that after I did the original data analyzes and I can include these papers. Although 2 papers sounds small, they have a lot of samples and drastically improve the sample size. Especially the paper by McClelland et al. (2024) can really supplement the paper. They sampled 476 benthic animals from two locations in the canadian Arctic. I would suggest that in addition to pooling all the data to see for general patterns, I use these data to verify if the feeding strategy also plays a significant role within the same dataset. I would add these additional analyses on several locations in the manuscript, so I will first describe my suggested addition here as I believe it is relevant for several suggestions you made.

Suggested edit

Evaluating the role of feeding strategy using a single large dataset

A third test of our hypothesis using field data from a single study to see if the same dynamics as occured in our model are present in these observations. We used MeHg bioaccumulation and trophic level data from 476 individuals across 53 taxa of benthic invertebrates as published by McClelland et al. (2024). These data were selected as it is the laregest study we could find with both trophic level and MeHg concentrations. When several animals of the same group where sampled, the dataset presents mean values per group per location, which we use as one datapoint in our analyses. Although feeding strategies in the dataset were broadly aligned with our classifications, we reassigned them to match the functional groups in our model. For example, shrimps were categorized as generalist feeders, which group is not present in McClelland et al. (2024), and isopods, which can be small benthic predators, were labeled as deposit feeders because their prey type is not represented in our model.

The data is sampled from two locations in the Canadian Arctic, Cape Bathurst (CB), which has a depth of 22 m and is located at $70°41'42.79''$ N, $128°50'21.34''$ W, and the eastern coast of Herschel Island in the Mackenzie Trough (MT), which has a depth of 116 m and is located at $69°36'44.96''$ N, $138°33'45.25''$ W. It must be noted this dataset is selected as it is extensive, but the region does have notable differences to the North Sea, where our model is run. It has extensive ice cover in winter, it is colder and is geographically distant from the model location. It does however, provide us with an opportunity to test if our model conclusions can be verified using field observations from a single study.

Author Response

I will add this to the methods section at line 218

Suggested edit

Evaluation of the model using a single dataset

To isolate the effect of the feeding strategy on MeHg bioaccumulation, we first transformed MeHg concentrations to their natural logartitm and fit a linear model with trophic level as predictor using the base R `lm()` function. The significance of the deviation from the predicted MeHg concentration at the trophic level was assessed using a one-sample t tests. To improve interpretability, we calculated the percentage differences using $\text{Percentage difference} = 100 \times \left(\frac{\text{MeHg}_{\text{obs}}}{\text{MeHg}_{\text{pred}}} - 1 \right)$ based on the residuals of the linear fit. This is visualized on a bar graph showing the percentage difference in MeHg concentration caused by the feeding strategy. The errors bars represent the 1 Standard Error (SE). The same analysis was then performed to estimate differences in MeHg bioaccumulation related to phylum.

As a final test, linear models were fitted on the natural logarithm of bioaccumulated MeHg concentrations using trophic level, phylum, and feeding strategy as predictor variables (using the `lm()` function in `R`). Estimated marginal means (EMM) for each feeding strategy were calculated with the `emmeans()` function of the emmeans package and compared against the overall mean to assess deviations. This analysis was also performed separately for the MT and CB locations to verify the consistency of the effects of the feeding strategy. The EMMs where transformed to a percentage difference with the earlier used equation and the estimated percentage difference due to feeding strategy and its signifance is shown.

Author Response

I will add this to the result and discussion about the literature study result section (3.1). At line 351.

Suggested edit

The fit of the linear model against the natural logarithm of the bioaccumulated MeHg is shown in Fig. 1. The R^2 is similar with 0.43 and 0.45 in the CB and MT respectively, while the bioaccumulation is a bit lower in the CB ($\log(\text{MeHg}_{\text{BA}})=0.137+1.14*\text{TL}$) compared to that in the MT ($\log(\text{MeHg}_{\text{BA}})=0.256+1.39*\text{TL}$), where MeHg_{BA} is the bioaccumulated MeHg in ng Hg mg^{-1} d.w. and TL is the trophic level. The influence of the feeding strategy on MeHg bioaccumulation based on the results of McClelland et al. (2024) is shown in Table 1. While the only significant effect is deposit feeders in the MT having less MeHg than would be expected on their trophic positions, some other effects are consistent, albeit not significant in both locations. The strongest effect is that filter feeders have consistently higher MeHg (residuals are 0.7 in the CB and 0.8 in the MT), while deposit feeders have lower MeHg (residuals are -0.2 in the CB and -0.5 in the MT). The results of the same analyses for phyla are shown in Table 2. Here we see two consistent significant effects. Molluscs have elevated MeHg levels (residuals are 0.61 in the CB and 0.51 in the MT) while arthropods have reduced MeHg values (residuals are -0.35 in the CB and -0.30 in the MT). The percentage difference in MeHg bioaccumulation per feeding strategy is visualised in Fig. 2 and per phyla in Fig. 3. The average percentage difference between observed and the expectation based on trophic level is 102% and 128% in the CB and MT respectively for filter feeders while deposit feeders have 19 and 37% less MeHg than would be predicted based on trophic level alone in the CB and MT respectively. In the the analysis per phylum we see that molluscs have highly elevated MeHg levels with an increase of 66%

and 85% respectively in the CB and MT. The largest reduction in observed MeHg compared to the predicted values based on trophic level is in arthropods, here there is a decrease compared to the predicted values of 29% and 26% in the CB and MT respectively.

The results of the final analyses are shown in Table 3. Despite the lower sample size, which reduces statistical power, the results indicate that filter feeders consistently have higher MeHg levels than predicted based on their trophic position and phyla, while deposit feeders tend to have lower MeHg concentrations. These results are stronger in the MT with a change of 118% and -40% in filter and deposit feeders respectively than in the CB with a change of 7.2% and -14.8% in filter and deposit feeders respectively. It must be stated that this final analysis is included to address potential concern between the co-correlation of phyla and feeding strategy, but the problem of the reduced sample size has to be addressed. In the CB, where the increase in MeHg in filter feeders is rather low after correcting for both trophic level and feeding strategy, there are only three filter feeders, which are molluscs, and they make up 3/5 mollusc samples in this location, meaning that results should be seen with skepticism as filter feeders and molluscs have too much overlap. On the other hand, in the MT, there are five filter feeders from multiple phyla (Mollusca and Echinodermata) and the effect is considerably stronger with filter feeders having 118% more MeHg than would be expected based on their trophic level and phyla.

Author Response

I will add the following component to the discussion to evaluate the uncertainty of these results.

Suggested edit

Combining the results of the model and the literature studies is difficult due to the high uncertainty in most drivers, including the organic material content of dry weight and result should be viewed with skepticism. The data used in this study was prepared by McClelland et al. (2024) to mimic consumption by predators: for small arthropods, their skin was not removed, but for gastropods and bivalves, the shell was not taken into account for the weight as predators would typically not eat this. The concentration of MeHg per unit energy is arguably the key measure in bioaccumulation. Predators need to ingest a specific energy amount, so if a prey is composed of half organic material and half non-organic components, such as shell, its MeHg content per dry weight is halved. However, predators would consume double the dry weight to obtain the energy, and thus the same MeHg. In general, the energy appears to be consistent with Ash Free Dry Weight (AFDW), as such ideally we would normalize all measurement of MeHg bioaccumulation per AFDW (Weil et al., 2019).
Unfortunately, doing this conversion reliably on published data is not possible as AFDW varies with the age and body size of animals, which information is not generally available (Eklöf et al., 2017). That being said, we find it convincing that both our model results, the literature study in which we aggregate all measurements, and the literature study where we take samples from a single study all suggest that filter feeders have elevated MeHg.

The difference in the uptake of MeHg and organic carbon is also the main driver in our model of the difference caused between the bioaccumulation in filter and deposit feeders. In the model this is mostly driven by the lower feeding efficiency of MeHg presented by (Dutton & Fisher, 2012). While the lower assimilation efficiency of MeHg from sediment is

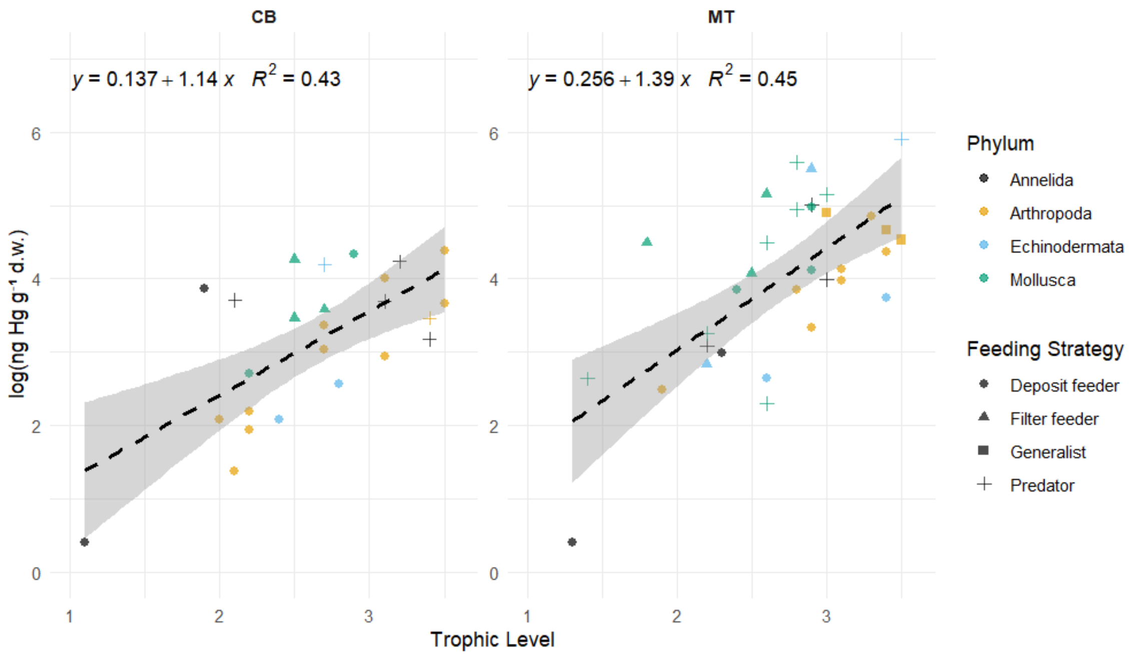

Figure 1: The linear fitted model between the natural logarithm of the bioaccumulated MeHg in ng Hg mg^{-1} d.w. and the Trophic Level in the data presented by McClelland et al. (2024). For extra clarity the different Phyla shown with different colors while the different feeding strategies are marked with different symbols. In both the CB and MT setups there positive relationship between trophic level and the bioaccumulation of MeHg, but R^2 is only 0.43 and 0.45 in the CB and MT respectively, so it does not explain the full variation in bioaccumulation.

understudied, it is supported by the limited available literature. In addition to the direct work by Dutton and Fisher (2012) analysing transfer efficiency of MeHg in the sediment to biota, it is also demonstrated that the concentration of MeHg in the sediment correlates poorly with the MeHg concentration in all biota, except infauna (Buckman et al., 2019; Chen et al., 2009). If MeHg would easily be transferred from the sediment to deposit feeders, there would be a much stronger correlation between sediment and deposit feeder MeHg concentrations.

More work is needed to analyse if molluscs also have elevated MeHg levels, especially when normalised to AFDW. While molluscs do appear to have more MeHg in our analyses,it is possible that the increase in MeHg in molluscs compared to other animals of the same trophic level is caused by a combination of co-correlation with the filter feeding strategy and an increase in AFDW percentage of dry weight in the mollusc samples as the weight of the shell was not taken into account. Focusing Hg monitoring on using a holistic approach in which ideally tHg, MeHg, trophic level and AFDW are sampled in fully identified species would help clarify whether bioaccumulation patterns associated with feeding strategy and phylum are robust and relevant for Hg risk management.

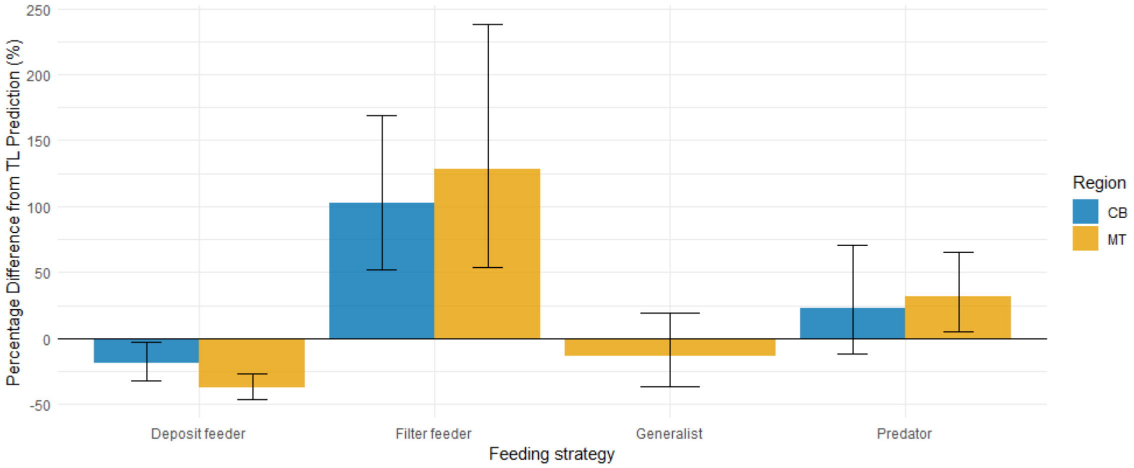

Figure 2: Percentage difference from trophic level predicted MeHg concentrations by feeding strategy, with error bars showing ±1 SE. In both CB and MT regions, filter feeders have elevated MeHg levels relative to trophic level based expectations, while deposit feeders are reduced. Predators display higher MeHg than predicted, though the effect is smaller than in filter feeders; in CB, this increase does not exceed one SE. Generalist feeders have a slight reduction compared to expectations, but this is well within one SE, and were not present in CB for cross-region comparison.

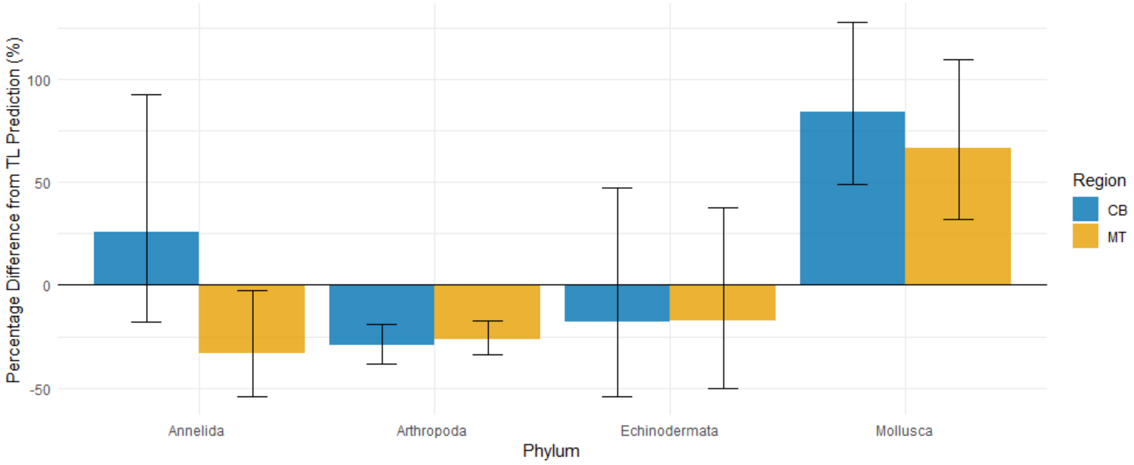

Figure 3: Percentage difference from the predicted MeHg bioaccumulated based on trophic level per phyla, the error bars represent ±1 SE. The notable phyla are Mollusca and Arthropoda, while Mollusca have a notable increase in MeHg bioaccumulation compared to the prediction of 85% and 66% respectively in the CB and MT, there is a reduction of 26% and 29% in Arthropoda in the CB and MT respectively. Annelida are inconsistent with an increase in the CB and decrease in the MT compared to the predictions. Echinodermata have a mean reduction compared to the prediction in both the CB and the MT, but the SE is much larger than the mean effect.

Table 1: Mean residuals (±SE) of log(MeHg) by feeding strategy and region, after trophic level correction. Significant deviations ($p < 0.05$) are marked with *.

Region	Feeding Strategy	n	Mean Residual ± SE	p-value
CB	Deposit feeder	16	-0.208 ± 0.181	0.268
CB	Filter feeder	3	0.704 ± 0.286	0.133
CB	Predator	6	0.203 ± 0.331	0.568
MT	Deposit feeder	15	-0.467 ± 0.159	0.011^*
MT	Filter feeder	5	0.824 ± 0.395	0.105
MT	Generalist	3	-0.143 ± 0.319	0.698
MT	Predator	12	0.277 ± 0.226	0.247

Table 2: Mean residuals (±SE) of log(MeHg) by phylum and region, after trophic level correction. Significant deviations ($p < 0.05$) are marked with *.

Region	Phylum	n	Mean Residual ± SE	p-value
CB	Annelida	6	0.229 ± 0.424	0.612
CB	Arthropoda	11	-0.349 ± 0.137	0.0294^*
CB	Echinodermata	3	-0.198 ± 0.584	0.767
CB	Mollusca	5	0.611 ± 0.211	0.0446^*
MT	Annelida	5	-0.405 ± 0.377	0.343
MT	Arthropoda	12	-0.304 ± 0.111	0.0196^*
MT	Echinodermata	5	-0.188 ± 0.509	0.730
MT	Mollusca	13	0.509 ± 0.231	0.0482^*

Table 3: The effect of feeding strategy on MeHg bioaccumulation per Region compared to the prediction accounting for both trophic level and feeding strategy. Significant ($p < 0.05$) is marked with *. There is still a consistent increase in filter feeders and a consistent decrease in deposit feeders. This is effect is larger in the MT with a relative percentage increase of 118% in filter feeders and a decrease of 40% in deposit feeders.

Feeding Strategy	**% Diff (MT)**	**p-value (MT)**	**% Diff (CB)**	**p-value (CB)**
Deposit feeder	-40.0	0.034*	-14.8	0.888
Filter feeder	118.0	0.034*	7.2	0.888
Generalist	-25.9	0.563	–	–
Predator	3.0	0.895	9.4	0.888

Author Response

Updated statistics due to extra data in the analyses

In addition to the extra papers added, a final small change was made: the assimilation efficiency of the deposit feeder was set to 0.12, as this is more in line with the literature presented by Dutton and Fisher (2012). To clarify, this and the addition of two more papers, of course, change the statistics and also highlight your concern about different base levels of Hg. The new statistical analyses are presented in Table 4. Because the new data has a higher baseline of MeHg, it indeed changes (in this case reduces) the agreement between the model and the observations in absolute terms. It does, however, not mean that the correlation between feeding strategies and elevated MeHg levels is different, as this remains consistent. To increase transparency of model fit, I will both show the R^2 based on the Pearson correlation coefficient and the Residual-Based R^2.

Suggested edit

Finally, the goodness of fit of the model is shown both based on the Pearson correlation coefficient and based on the residuals. It is important to note the difference between the R^2 based on the Pearson correlation coefficient ($\mathrm{R^2}_{\mathrm{Pearson}}$) and the Residual-Based R^2 ($\mathrm{R^2}_{\mathrm{Residual}}$). They are defined as $R^2_{Pearson} = (\mathrm{corr}(y_{\mathrm{mod}}, y_{\mathrm{obs}}))^2$ and the $R^2_{Residual} = 1 - \frac{\sum(y_{\mathrm{obs}} - y_{\mathrm{mod}})^2}{\sum(y_{\mathrm{obs}} - \bar{y}_{\mathrm{obs}})^2}$, where y_{obs} are the mean observed values and y_{mod} are the mean modeled value per feeding strategy. The $\mathrm{R^2}_{\mathrm{Pearson}}$ describes how well a linear relationship between our model and the data holds, thus, if this is high, the models explain the observed differences between feeding strategies well, but it is not effected by the absolute concentrations. This means that the $\mathrm{R^2}_{\mathrm{Pearson}}$ evaluates if our model accurately represents differences between feeding strategies, but it is not affected by a bias in the data due to mismatch between the baseline of MeHg bioaccumulation. The $\mathrm{R^2}_{\mathrm{Residual}}$ measures how well the modeled values match the observations, including absolute values, which is both affected by the ability of the model to predict the effect of feeding strategy on bioaccumulation, and by overal concentrations of iHg and MeHg in biota. Both $\mathrm{R^2}_{\mathrm{Pearson}}$ and $\mathrm{R^2}_{\mathrm{Residual}}$ give a value below 1. Closer to 1 means a better fit while below 0 means that the the model does not outperform estimating the data based on the mean.

Suggested edit

The $\mathrm{R^2}_{\mathrm{Pearson}}$ is high (>0.86) for MeHg in all setups and exceeds 0.99 in the AS model, indicating that the model captures the relative differences between feeding strategies well. For iHg, performance is lower, particularly in the Northern North Sea ($\mathrm{R^2}_{\mathrm{Pearson}} = 0.24$). The ability to reproduce absolute bioaccumulation is more limited. Only the AS model in the Southern North Sea shows good agreement ($\mathrm{R^2}_{\mathrm{Residual}} = 0.96$), while all other setups yield $\mathrm{R^2}_{\mathrm{Residual}} < 0$, suggesting that using the mean of the observations would outperform the model.

This can be explained, as baseline MeHg levels vary between sampling regions. Notably, the AS model in the Southern North Sea performs well both in reproducing overall MeHg levels and in explaining variability across feeding strategies. Even when excluding predators and top predators, $\mathrm{R^2}_{\mathrm{Pearson}}$ remains high (0.80), suggesting that feeding strategy effects are captured across trophic levels and are not just driven by high MeHg levels in predatorial feeding strategies. In contrast, the Northern North Sea has a high $\mathrm{R^2}_{\mathrm{Pearson}}$ (=0.94) but low $\mathrm{R^2}_{\mathrm{Residual}}$ (<0) so it captures the effect of feeding strategies while not being able to resplicate absolute MeHg concentrations.

Table 4: Statistical analysis of model performance for iHg and MeHg levels by feeding strategy for Southern North Sea (SNS) and Northern North Sea (NNS).

	SNS				**NNS**			
	iHg		**MeHg**		**iHg**		**MeHg**	
	N. Bias	**BF10**	**N. Bias**	**BF10**	**N. Bias**	**BF10**	**N. Bias**	**BF10**
Suspension	0.18	0.11	0.85	0.011	-0.18	0.11	0.17	0.0072
Filter	1.48	0.47	-0.33	0.046	1.45	0.069	-0.71	0.054
Deposit	1.01	0.078	-0.44	0.046	0.34	0.034	-0.77	0.052
Generalist	1.31	0.18	-0.39	0.047	1.23	0.14	-0.75	0.055
Predator	0.41	0.081	-0.42	0.10	0.07	0.079	-0.71	0.074
Top predator	-0.22	0.089	-0.80	0.51	-0.46	0.10	-0.93	0.59
Predator (AS)	0.41	0.081	-0.31	0.093	0.07	0.079	-0.75	0.11
Top predator (AS)	-0.22	0.089	-0.12	0.35	-0.46	0.10	-0.67	0.45
Overall Model Performance								
RMSE	40		132		40		147	
NRMSE	0.36		0.35		0.35		0.39	
$\mathbf{R^2_{Pearson}}$	0.61		0.86		0.24		0.94	
$\mathbf{R^2_{Residual}}$	<0		<0		<0		<0	
RMSE (AS)	40		22.8		27		108	
NRMSE (AS)	0.36		0.061		0.26		0.29	
$\mathbf{R^2_{Pearson}}$ **(AS)**	0.61		>0.99		0.24		>0.99	
$\mathbf{R^2_{Residual}}$ **(AS)**	<0		0.96		<0		<0	

2 Specific Comments

Reviewer Comment

Data on mercury concentrations in marine megabenthos were compiled and examined for differences in bioaccumulation by feeding strategy. It appears a relatively small number of studies were used (n = 12, Table 5) compared to available published data on mercury in marine megabenthos. What criteria were used for the literature review and selection of papers?

Author Response

The papers were selected with a focus on having both trophic level and MeHg concentrations estimated in marine megabenthos. These studies are indeed less common than studies sampling only metal concentration, including total Hg. While verifying new literature, I did find two new papers that were published last year that I would now include in the analyses. One of these papers has a very substantial dataset that allows us to verify our hypothesis purely based on this data at the beginning of this answer.

Reviewer Comment

More information on the measurement of mercury burdens in the megabenthos studies seems important to include for interpretation and standardization. Sometimes megabenthos tissues cannot be sampled consistently due to differences in exoskeleton and body form. What tissue types were measured for mercury? (e.g., whole body [including exoskeleton], internal viscera, muscle). How was inorganic mercury concentration determined? (i.e., the studies in Table 5 do not include inorganic mercury). Are the modelled concentrations for whole body of megabenthos (e.g., Figure 6)?

Author Response

The bioaccumulation in the model and the output in Fig. 6 is shown to be in ng Hg per mg carbon. In the model we tried to isolate the effect of the feeding strategy on bioaccumulation, so the conversion to dry weight assumes a 1:2 ratio. Most measurements indeed express bioaccumulation in dry weight and the carbon content of biota is seldom measured alongside Hg. The conversion from carbon to dry weight does indeed introduce uncertainty, but it is within reasonable levels. For example. the soft part of molluscs are for example found to have between 36% and 48% carbon per dry weight while the carbon content of artrophods (mysis mixta) was found to be 51.4% (Gorokhova & Hansson, 2000; Jurkiewicz-Karnkowska, 2005). The complications is that the study aims to look at the feeding strategy, which does very between phyla. Filter feeders can, for example, be either arthropods in the form of barnacles, molluscs in the form of bivalves, annelids in the form of of fan worms, or echinoderms in the form of brittle stars, because of this a standard 1:2 conversion ratio between carbon and dry weight was kept consistent over all feeding strategies. I will add these citations to the manuscript at the end of the model development section (line 152)

Suggested edit

Our model is resolved in carbon content, while measurements are often in dry weight. The carbon fraction of dry weight generally ranges from 0.4 to 0.6, but can vary between different taxa (Gorokhova & Hansson, 2000; Jurkiewicz-Karnkowska, 2005). To ensure consistency across different functional groups with diverse feeding strategies, we maintain a 1:2 conversion ratio for carbon to dry weight for all megabenthos functional groups.

Reviewer Comment

The empirical mercury data for megabenthos were pooled across geographic locations where environmental mercury exposure may have differed. How were potential confounding effects of geographic variation and feeding strategy resolved? Were the findings of feeding strategy influence on mercury burdens consistent with individual studies from specific geographic areas?

Author Response

I agree that this is an issue. We tried to validate our model findings using data, but data is not sufficiently available for all geographic locations to robust individual analyses. In order to address your concerns, we added the analyses solely based on the data presented (McClelland et al., 2024). Based on this, we can see that the results of our studies are consistent between the model, by pooling all geopgraphical locations and by analysing two individual locations.

Reviewer Comment

Organism bioaccumulation is described as involving two key processes: bioconcentration and biomagnification (lines 26-34). A more nuanced discussion is suggested here on exposure pathways and also clarification on the mechanistic processes that were modelled. Uptake of aqueous inorganic mercury and methylmercury into the food web occurs via bioconcentration in primary producers. However, consumers are typically exposed to mercury primarily through their diet and not via bioconcentration from water.

Author Response

I will add the following expansion to section 2.5 on line 121. I would replace the part where I discuss the evaluation of the previous version of the model. The changes in megabenthos can have a feedback on Hg cycling so I added a new paragraph on the evaluation of pelagic Hg cycling and bioaccumulation later in the review. But then I can discuss the implementation of bioaccumulation in more detail here.

Suggested edit

Bioaccumulation is implemented to account for bioconcentration in all trophic levels and biomagnification in all consumers. Phytoplankton have a size-dependent uptake and release rate for the uptake and release of iHg. Based on observations by Pickhardt et al. (2006) which found higher MeHg in smaller phytoplankton but consistent iHg levels, phytoplankton have a size-dependent uptake rate and constant release rates. This means that diatoms and flagellates bioaccumulate similar amounts of iHg, while the smaller flagellates accumulate more MeHg. The uptake and release rates of iHg and MeHg in zooplankton are based on Tsui and Wang (2004) and on W. Wang and Wong (2003) for fish. An essential component of the ecosystem that interacts with bioaccumulation in megabenthos that was not overhauled for this study are the interactions between detritus and DOM and iHg and MeHg. The only Hg^{2+} and $MMHg^{+}$ are assumed to partition to detritus and DOM, and this partitioning is assumed to be an equilibrium that is instantaneous and is reestimated on every time step. The equilibrium is based on the K_{ow} values which are based on Allison et al. (2005) and Tesán Onrubia et al. (2020). This value is log10(6.4) and log10(6.6) for the partitioning of Hg^{2+} and log10(5.9) and log10(6.0) for the binding of $MMHg^{+}$ to detritus and DOM respectively. This is the same approach that is used and evaluated in Bieser et al. (2023) and Amptmeijer et al. (2025).

Reviewer Comment

Figure 6 shows modelled concentrations in biota, where bioconcentrated and biomagnified mercury are differentiated. These model results are not consistent with known trophic transfer processes of mercury. In higher trophic level biota, very little of the total mercury burden is inorganic mercury (e.g., in contrast with modelled result for a top predator) and most mercury is obtained from diet rather than water (bioconcentration). In Figure 6, much of the bioaccumulated mercury is attributed to bioconcentration. E.g., see Wang and Wang, Environmental Pollution 2019, Volume 252, Part B, September 2019, Pages 1561-1573, and other studies cited therein.

Author Response

This image stems from an admittedly awkward design choice in the paper. As stated in the paper, we aimed to enhance the model's performance over its previous version by modifying how iHg and MeHg are released during respiration. While some species have relatively high iHg concentrations, it is typically much higher and is better depicted in the Allometric Scaling (AS) model. The image presented is of the base model, which shows MeHg levels that, while in the observed range, are below average observations. Additionally, while some experimental studies such as presented by W. Wang and Wong (2003) find that bioconcentration can be a major exposure route in fish, I agree that it is typically expected to be smaller, as is the case in the AS model.

To improve this in the manuscript we will display the bioaccumulation per group per source for the AS model, as depicted in Fig. 4. This is the better performing model and focusing the visualization on the base model creates unnecessary ambiguity. In the AS model, top predators have 80-90% of tHg from MeHg from biomagnification, which is more in line with the observations by W. X. Wang and Tan (2019). Bioconcentration remains a significant route in the model, but based on W. Wang and Wong (2003) this is in line with obervations. I will move the image to the end of section 3.3 (line 301). So it can be discussed after the evaluation of the base setup and AS model is presented.

Reviewer Comment

The focus of this study is on megabenthos, i.e. consumer organisms. However, a key process that warrants more modelling attention is the process of methylmercury entry in the food web via primary producers. Figure 6 shows modelling results for diatoms and dinoflagellates. How do those mercury concentrations compare with empirical data for phytoplankton? How can the inorganic mercury and methylmercury in primary producers be a result of biomagnification, as indicated in the figure?

Author Response

About the labeling in Fig. 6, my apology that is indeed mislabeled. I will correct this as shwon in Fig. 4. I think the question surrounding the comparison with phytoplankton aligns with your question about the model validation in the technical comments section "Line 195. Provide more detail on how the model performance was evaluated.". Since

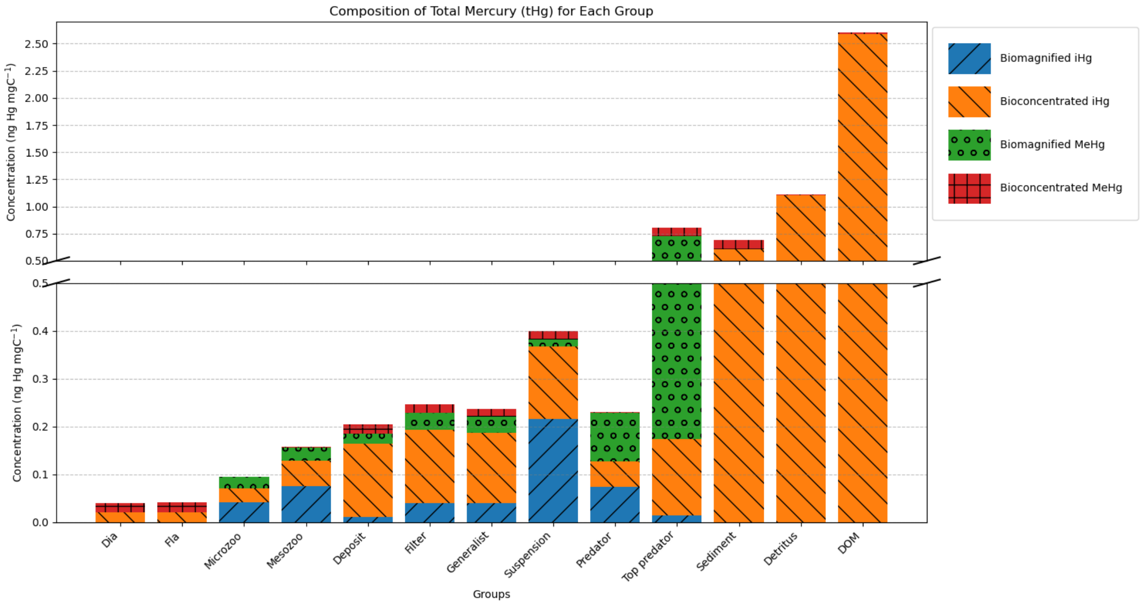

Figure 4: Modeled bioconcentration and biomagnification of iHg and MeHg. Partitioning to detritus and DOM is colored as bioconcentration. The y-axis is cut to show the high and low values. Notably is the high iHg to mgC ratio of detritus and DOM, leading to elevated iHg in suspension feeders. Additionally, higher trophic level animals have higher biomagnified MeHg.

the model is quite extensively evaluated for the bioaccumulation in megabenthos, I will add the following paragraph about the evaluation of the model performance in the pelagic before the evaluation of the bioaccumulation in benthos. So this would be section 2.1.1 on line 193, and the current section about the evaluation of megabenthos would be on line 2.1.2.

Suggested edit

2.1 Evaluation of the Hg cycling and pelagic bioaccumulation

The marine cycling and speciation of Hg, in addition to the bioaccumulation in phytoplankton and zooplankton, is an essential driver of the bioaccumulation of iHg and MeHg in the benthic food web. Observed and modelled dissolved tHg concentration, the percentage of tHg that is MeHg, and the Hg content of phytoplankton and zooplankton is shown in Table 5. The concentration of dissolved tHg and the percentage of MeHg of dissolved tHg are compared to observations by Coquery and Cossa (1995), while the bioaccumulation of tHg in phytoplankton and zooplankton is compared to observations by Nfon et al. (2009). It must be noted that the observations by Nfon et al. (2009) are not from the North Sea itself, but from the better-studied nearby Baltic Sea. The average dissolved tHg concentration is 1.7 and 2.1,pM in the Northern and Southern North Sea, respectively. This is well within 1 standard deviation of the 1.7±0.7 pM observed by Coquery and Cossa (1995). The MeHg concentration was observed to be between 0.5 and 4.3% of tHg, with an average of 3% in the North Sea. The percentage MeHg in our model is 2.3% and 2.0% on average, which falls well within that range.
For bioaccumulation, we could not find separate reliable measurements of MeHg and iHg in phytoplankton and zooplankton in the North Sea, and we therefore evaluated the tHg content. This was measured in diatoms to be 10±5 ng Hg mg^{-1}. This means that the mean bioaccumulation in our model in diatoms is lower, with 5.8 ng Hg mg^{-1} and 9.0

ng Hg mg^{-1} in the Northern and Southern North Sea, respectively, but still within 1 standard deviation of the measurements. Observations labeled as zooplankton and mysis were compared to our modeled microzooplankton and mesozooplankton, respectively. All modeled values fall within 1 standard deviation of the observed tHg concentration, with one exception: mesozooplankton in the Northern North Sea, which is 13.5% more than 1 standard deviation above the observations. This is mostly driven by a high iHg content, as the MeHg content is similar in microzooplankton and mesozooplankton.

This similarity in MeHg is caused because, even though mesozooplankton have a higher trophic level, they prefer to feed on larger diatoms which have less MeHg than smaller flagellates, which are preferred by microzooplankton. The high iHg content, especially in the Northern North Sea, is caused by the consumption of detritus by zooplankton in the model. While there is a shortage of data on bioaccumulation at the base of the food web, especially in the North Sea, which complicates model evaluation, the dissolved tHg concentration, the percentage of MeHg, and the tHg content of phytoplankton and zooplankton agree well with observations. With the exception of the 13.5% elevated tHg content in Northern North Sea mesozooplankton, all modeled values fall within 1 standard deviation of the observations. Because of this, we conclude that the model replicates marine Hg cycling and bioaccumulation at the base of the food web in line with observations, with the caveat that we do not have measurements of zooplankton in the Northern North Sea to verify or reject the elevated levels in that setup.

Table 5: Dissolved total Hg (pM), MeHg (% of tHg), and Hg concentrations in biota (ng Hg mg^{-1} d.w.) across North Sea regions.

	Observed	NNS	SNS
$tHg_{dissolved}$ (pM)	1.7 ± 0.7	1.7 ± 0.26	2.0 ± 0.28
MeHg (% of tHg)	3 (0.5–4.3)	2.3 ± 0.23	2.0 ± 0.31
Diatoms (ng Hg mg^{-1})	10 ± 5	7.0 ± 1.1	8.3 ± 1.6
Flagellates (ng Hg mg^{-1})		13.9 ± 3.0	14.3 ± 3.0
Microzooplankton tHg (ng Hg mg^{-1})	37.5 ± 31.3	67.4 ± 29.3	40.3 ± 11.4
Microzooplankton MeHg (ng Hg mg^{-1})		7.1 ± 2.1	10.5 ± 2.7
Mesozooplankton tHg (ng Hg mg^{-1})	62.5 ± 12.5	86.7 ± 15.1	72.3 ± 19.6
Mesozooplankton MeHg (ng Hg mg^{-1})		6.9 ± 2.6	10.5 ± 1.7

3 Technical Corrections

Reviewer Comment

Line 8. Is the inorganic mercury in filter feeders elevated, or more specifically, is it found as a higher proportion of total mercury compared to other megabenthos?

Author Response

No, filter feeders do not have elevated iHg levels. The iHg levels in filter feeders are large part of tHg, but filter feeders have similar iHg as most other macrobenthos but elevated MeHg levels, thus a reduced proportion of iHg of tHg. The main megabenthos group that has notably increase in iHg are the suspension feeders. They are defined by their ability to eat DOM (resembling sponges), where filter feeders cannot filter out dissolved particles. Suspension feeders on the other hand, have both elevated iHg levels and an elavated iHg to tHg ratio. This is true both in the model and in the observation in Meditereanean Sea sponges by Orani et al. (2020).

Reviewer Comment

Line 18. Cite a reference for this statement.

Author Response

I will expand on this sentence and add the reference as below:

Suggested edit

Anthropogenic emissions have significantly raised environmental Hg levels, with 78%, 85%, and 50% of atmospheric, upper ocean, and deep ocean Hg, respectively, originating from anthropogenic emissions (Geyman et al., 2025).

‘

Reviewer Comment

Line 26-27. Does bioconcentration only occur in a polluted environment? Is the model then only relevant for polluted environments?

Author Response

I will update that as below.

Suggested edit

There are two key processes involved in bioaccumulation: bioconcentration and biomagnification. When animals absorb Hg directly from their environment; this is called bioconcentration.

Reviewer Comment

Line 45. The first effectiveness evaluation of the Minamata Convention has not been completed. Rephrase this text.

Suggested edit

Mercury concentrations tend to be lower in organisms at the base of the aquatic food web, resulting in reduced risk to humans. As such, these organisms are not prioritized in the current monitoring strategies under the ongoing effectiveness evaluation of the Minamata Convention, which focuses primarily on fish, humans, and predatory wildlife (Evers et al., 2016). Additionally, the evaluation to date has shown that Hg and MeHg concentrations in water and sediment do not correlate well with levels in biota, leading to greater emphasis on biological monitoring over abiotic compartments.

Reviewer Comment

Line 51-52. Some megabenthos are not lower trophic level biota (e.g., are secondary consumers) and thus are not necessarily representative of processes at the base of the food web.

Author Response

That is true and the paper does also look at higher trohic level benthos. I will refrase this as follows:

Suggested edit

The benthic food web is highly complex, making it challenging to improve our understanding of bioaccumulation within it (Silberberger et al., 2018).

Reviewer Comment

Line 74. Perhaps change “in silico” to “a modelling experiment”

Suggested edit

Afterward, we conducted a modeling experiment in which megabenthos with various feeding strategies compete under physical drivers in idealized scenarios that are typical of megabenthos-rich coastal oceans.

Reviewer Comment

Line 86-89 and elsewhere. Use past tense to describe work that was completed.

Author Response

I will change that anywhere in the manuscript. I will update the paragraph with line 86-89 as below to correct this writing style:

Suggested edit

To compare the findings with the literature, we collected field studies measuring Hg in megabenthos. The studies we used are shown in Table 6. We categorized the megabenthos into the same feeding categories, ”deposit feeder”, ”filter feeder”, ”suspension feeder”, ”grazer”, and ”predator”. To better look at the effect of the trophic level, we also added ”primary producers” as the base of the food web, and ”seabird” and ”benthic fish” as top predators. We analyzed whether trophic level and feeding strategy influence megabenthos iHg, MeHg, and/or tHg content. The observations were analyzed by visualizing the data, performing linear regression, and plotting a correlation matrix of the differences in bioaccumulation between different feeding strategies. The total and partial R^2 of the linear regression of the trophic level and the feeding strategy were compared to analyze the effect of both drivers on bioaccumulated iHg, MeHg, and tHg.

Reviewer Comment

Figure 1. What is the black line that connects biota to detritus, DOM and sediment organic carbon?

Author Response

I will update the caption of the figure as stated in Fig. 5. I also added a dotted black line to show mortality from phytoplankton and zooplankton.

Reviewer Comment

Line 186. Rephrase “samples are sampled”

Suggested edit

Because of this, most samples are from shallow, well-mixed coastal areas, and we used this setup to evaluate the performance of the models.

Reviewer Comment

Section 3.1. How do the results of this analysis compare with published findings reported in the literature?

Author Response

In the literature there is relatively little attention to direct role of feeding strategy or phyla on bioaccumulation. Several individual papers remark things such as that mussels have higher values than crustaceans but I could not find our main connclusion supported in the literature. That being said, I hope the expansian of the paper by doing the further analyses with the data presented by McClelland et al. (2024) is convincing that while this interaction itself is not supported as a conclusion in literature studies, published data does support our conclusions.

Reviewer Comment

Line 255. Unclear meaning – “validate that they survive in the model”

Suggested edit

While our megabenthos groups only vary in their feeding strategies and lack a direct real-world counterpart, it is important to ensure that all functional groups have consistent biomass in the model and thus the results originate from the modeled interactions, and are not altered due to unrealistically high or low biomass in the model.

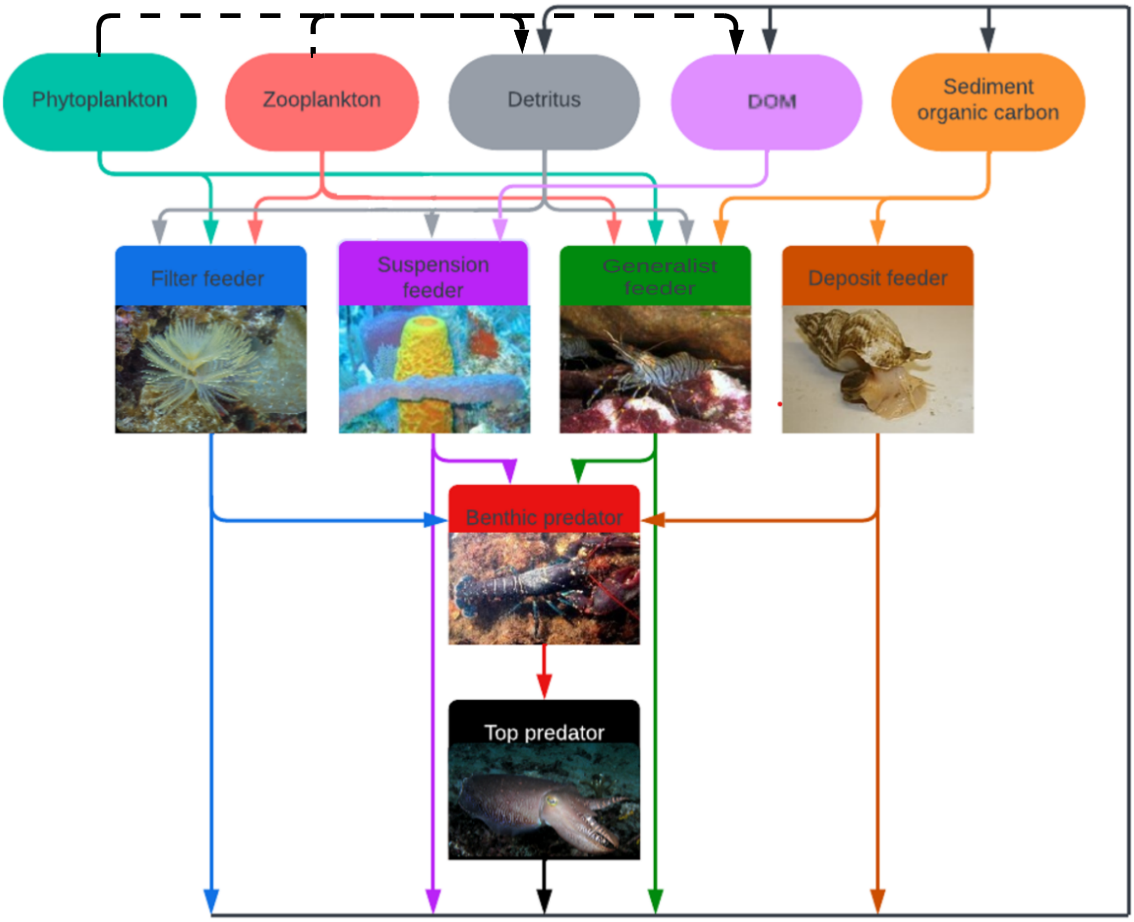

Figure 5: The overview of the modeled megabenthos functional groups and how they interact with each other and functional groups in the ECOSMO E2E model. There are 5 macrobenthic functional groups. The filter feeder feeds on pelagic detritus, zooplankton, and phytoplankton. The suspension feeders feed on pelagic detritus, phytoplankton, zooplankton, and DOM. The generalist feeds on phytoplankton, zooplankton, pelagic detritus, and sediment organic carbon. The deposit feeder feeds on sediment organic carbon. The benthic predator feeds on the other 4 megabenthos functional groups and the top predator solely feeds on the benthic predator. The arrows indicate trophic interactions where the arrow goes from the prey to the predator and the arrows have the same colour as the prey. The black lines represent loss of organic material due to mortality. When megabenthos die, their organic carbon is transferred to pelagic DOM and detritus, as well as the sediment, shown by the solid black arrow. In contrast, when pelagic organisms die, their organic carbon is transferred to DOM and detritus, indicated by the dotted black arrow.

Reviewer Comment

Figure 6. How do mercury concentrations per unit carbon (reported in Figure 6) compare to literature reported values that do not take carbon content into account?

Author Response

As described in above, the conversion factor of carbon to dry weight is assumed to be a 1:2 ratio for all functional groups. This conversion is indeed a source of uncertainty. I expanded on this in the suggested expansion of the paper at the beginning of the revieuw, additionally as mentioned above I will ad a brief explanation of the conversion factor on line 152. I hope that this expansion provides enough depth there.

Reviewer Comment

Line 310-313. Are there published empirical studies that support this model prediction regarding filter feeders?

Author Response

There is published emperical data, as described at the beginning of these answer, that supports our conclusion. But no studies direclty comparing filter feeders in the way we did in this study with other feeding strategies. So our conclusion comes from the combination of having measurements that show elevated MeHg levels in filter feeders combined with a modeling explanation as why this might be because they are filter feeders.

Reviewer Comment

Line 361. Does the bioaccumulated inorganic mercury originate from water or dietary exposure?

Author Response

The majority of this in all catagories except suspension feeders is via bioconcentration, thus uptake from the water. I would expand the sentence at line 361 to clarify this better.

Suggested edit

In Fig. 6 we can see that the vast majority of iHg in filter, deposit, and generalist feeders originates from bioconcentration, thus direct uptake from the water is the dominant pathway of iHg bioaccumulation in our model in these feeding strategies.

Reviewer Comment

Line 394. Explain further what is meant by “in vivo mercury speciation”.

Author Response

I will expand by the explanation in line 194 as follows:

Suggested edit

A final interaction that we did not take into account is *in vivo Hg speciation.* With in vivo Hg speciation we refer to the transfer of Hg from one form to another inside organisms. Examples of this are the earlier mentioned demethylation in sponges by Orani et al. (2020) and additional studies demonstrating Hg speciation in cuttlefish by Gente et al. (2023) and Hg-methylating bacteria in copepods by Gorokhova et al. (2020). This indicates that the bioaccumulation of inorganic Hg and methylmercury may not be fully independent processes. These reactions are currently, however, poorly understood, and more laboratory and field studies are necessary to improve our understanding of these transformations before their significance can be assessed and it can be determined whether their inclusion in bioaccumulation models is needed.

Reviewer Comment

Line 411. Where are these regression results presented earlier in the manuscript?

Author Response

They are from Table 3 where the model is evaluated, but I can better describe the table outcome in text. I would add the following part to the end of section 3.3. where I discuss the results of the allometric scaling model.

Suggested edit

Our base model does agree well with both observed iHg (R^2=0.84) and MeHg (R^2=0.86) in the Southern North Sea setup, but this is mostly driven by accurate predictions in the lower trophic levels while there is a normalized bias of -0.84 in the Top Predators. This is improved dramatically in the allometric scaling model with the reduction of the normalized bias of top predators to -0.32 which improves the overal R^2 of the model to >0.99.

Reviewer Comment

Line 436-437. This comment about bivalve communities is speculative.

Reviewer Comment

Line 441-442. Consider concluding the paper with a recommendation for future work on model development.

Author Response

I will answer these comments together by suggesting a rewrite of the closings remarks. I agree that it is speculative but I do think, especially considering the addition of the further analyses that also points als mollusc as being higher in MeHg that it is logical next step to take into account based on the results of this study. Would refrasing as below, and the expansion of the litearture study that point in the same direction be an acceptable form to refrase it?

Suggested edit

Filter feeders and molluscs typically accumulate more MeHg than other organisms at similar trophic levels. This pattern is consistent not only in our models but also in available data. This raises a hypothesis that expanding bivalve populations, as seen in mussel or oyster farming, might affect MeHg bioaccumulation in higher trophic levels. This is supported by the observations that fish in lakes invaded by zebra mussels have higher Hg levels than fish in lakes without zebra mussels Blinick et al. (2024). However, such ecological alterations also impact other bioaccumulation factors like biomass distribution and trophic interactions. While our findings support the role of filter feeders and molluscs in MeHg dynamics and higher bioaccumulation in top predators, the complexity of ecological situations requires further specific studies to understand if and when bivalve communities lead to increased MeHg transfer.

Modeling studies can help our understanding of the factors influencing MeHg bioaccumulation, but their predictive capabilities need to be carefully validated. Our findings reveal that filter-feeding mollusks and DOM-utilizing sponges exhibit distinct Hg bioaccumulation patterns compared to other megabenthos. Modeling bivalve aquaculture or DOM-consuming Porifera can help explore their potential role in altering MeHg bioaccumulation. Understanding how functional traits like feeding strategy influence MeHg transfer remains key to improving both predictive models and environmental risk assessments.

Author Response

I would also add this section at the end of the model evaluation segment

Suggested edit

Evaluation of the GOTM-MERCY-ECOSMO setup reveals performance strengths and weaknesses of the model. There is a strong correlation between the modeled and observed effect of the feeding strategy on the bioaccumulation of MeHg in both the Northern and Southern North Sea setups. However, the Southern North Sea setup outperforms the Northern setup in both pelagic Hg cycling and megabenthos bioaccumulation assessments. In the Northern North Sea setup, the mesozooplankton tHg levels are higher than expected, although this could not be properly validated due to a lack of measurements. What is more notable is our model results show a reduction in MeHg bioaccumulation in the Northern North Sea compared to the Southern North Sea, while this is not present in the observations presented by McClelland et al. (2024). Since the Northern North Sea does have a good agreement with observations in the correlation between the feeding strategy and the bioaccumulation of MeHg, but the overall model performance is lower due to lower than expected MeHg concentrations in all benthic groups, it is likely that the model underestimates the flux of MeHg from the pelagic to the benthic system. In the Southern North Sea setup, macrobenthos can feed directly on the phytoplankton bloom which results in a major exchange of organic material and MeHg between the benthic and pelagic food webs. In the Northern North Sea this is not possible, and the consumption of detritus, either by filtering it from the water or feeding on it from the sediment, is the main food source for megabenthos. The higher performance of the model in the Southern North Sea compared to the Northern North Sea indicates that this model could be further improved by enhancing the MeHg dynamics in deeper water.

4 Appendix

Table 6: Data used for the literature study. TL = trophic level, FS = feeding strategy. Values for tHg and MeHg are in ng Hg mg^{-1} d.w.. Samples that where marked as large and small are marked with (l) and (s) in the table respetively.

Species	TL	FS	THg	MeHg	Location	Phylum	Reference
Stronglyocentrotus droebachiensis	187	Deposit	24	2	Svalbard	Echinodermata	Korejwo et al., 2022
Ophiopholis aculeata	270	Filter	47	2	Svalbard	Echinodermata	Korejwo et al., 2022
Baccinum glaciale	371	Deposit	49	12	Svalbard	Mollusca	Korejwo et al., 2022
Henricia sp	317	Predator	348	19	Svalbard	Echinodermata	Korejwo et al., 2022
Astarte borealis	290	Filter	44	10	Chukchi Sea	Mollusca	Fox et al., 2013
Ampelisca macrocephala	270	Deposit	70	32	Chukchi Sea	Arthropoda	Fox et al., 2013
Chinoecetes opilio	410	Predator	131	102	Chukchi Sea	Mollusca	Fox et al., 2013
Neptunea heros	430	Predator	195	171	Chukchi Sea	Mollusca	Fox et al., 2013
Buccinum spp	410	Predator	269	171	Chukchi Sea	Arthropoda	Fox et al., 2013
Gammarellus sp.	237	Predator	39	15	Gulf of St. Lawrence	Mollusca	Lavoie et al., 2010
Littorina littorea	229	Grazer	51	13	Gulf of St. Lawrence	Mollusca	Lavoie et al., 2010
Buccinum undatum	283	Predator	127	85	Gulf of St. Lawrence	Mollusca	Lavoie et al., 2010
Tectura testudinalis	200	Grazer	51	9	Gulf of St. Lawrence	Mollusca	Lavoie et al., 2010
Strongylocentrotus droebachiensis	169	Deposit	42	5	Gulf of St. Lawrence	Echinodermata	Lavoie et al., 2010
Hippoglossoides platessoides	422	Benthic fish	146	77	Gulf of St. Lawrence	Chordata	Lavoie et al., 2010
Glyptocephalus cynoglossus	422	Benthic fish	179	100	Gulf of St. Lawrence	Chordata	Lavoie et al., 2010
Somateria mollissima	347	Seabird	640	565	Gulf of St. Lawrence	Chordata	Lavoie et al., 2010
Anguilla anguilla		Benthic fish	1161	895	Baltic Sea	Chordata	Polak-Juszczak, 2018
Gadus morhua		Benthic fish	346	269	Baltic Sea	Chordata	Polak-Juszczak, 2018
Platichtys flesus		Benthic fish	77		Baltic Sea	Chordata	Polak-Juszczak, 2014
Platichtys flesus		Benthic fish	58		Baltic Sea	Chordata	Polak-Juszczak, 2014
Pleuronectes platessa		Benthic fish	51		Baltic Sea	Chordata	Polak-Juszczak, 2014
Pleuronectes platessa		Benthic fish	40		Baltic Sea	Chordata	Polak-Juszczak, 2014
Scophthalmus maximus		Benthic fish	114		Baltic Sea	Chordata	Polak-Juszczak, 2014
Scophthalmus maximus		Benthic fish	85		Baltic Sea	Chordata	Polak-Juszczak, 2014
Macoma balthica		Deposit	53		Baltic Sea	Mollusca	Polak-Juszczak, 2014
Macoma balthica		Deposit	25		Baltic Sea	Mollusca	Polak-Juszczak, 2014
Saduria entomon		Predator	21		Baltic Sea	Arthropoda	Polak-Juszczak, 2014
Saduria entomon		Predator	14		Baltic Sea	Arthropoda	Polak-Juszczak, 2014
Acanthella acuta		Suspension	115	6	Mediterranean Sea	Porifera	Orani et al., 2020
Acanthella acuta		Suspension	66	7	Mediterranean Sea	Porifera	Orani et al., 2020
Acanthella acuta		Suspension	107	11	Mediterranean Sea	Porifera	Orani et al., 2020
Acanthella acuta		Suspension	95	9	Mediterranean Sea	Porifera	Orani et al., 2020
Axinella damicornis		Suspension	148	4	Mediterranean Sea	Porifera	Orani et al., 2020
Axinella damicornis		Suspension	97	2	Mediterranean Sea	Porifera	Orani et al., 2020
Axinella damicornis		Suspension	212	9	Mediterranean Sea	Porifera	Orani et al., 2020
Axinella damicornis		Suspension	252	7	Mediterranean Sea	Porifera	Orani et al., 2020
Chondrilla nucula		Suspension	149	2	Mediterranean Sea	Porifera	Orani et al., 2020
Chondrilla nucula		Suspension	233	1	Mediterranean Sea	Porifera	Orani et al., 2020
Chondrilla nucula		Suspension	519	4	Mediterranean Sea	Porifera	Orani et al., 2020
Chondrilla nucula		Suspension	317	4	Mediterranean Sea	Porifera	Orani et al., 2020
Haliclona fulva		Suspension	80	3	Mediterranean Sea	Porifera	Orani et al., 2020
Haliclona fulva		Suspension	76	2	Mediterranean Sea	Porifera	Orani et al., 2020
Haliclona fulva		Suspension	107	6	Mediterranean Sea	Porifera	Orani et al., 2020
Haliclona fulva		Suspension	146	6	Mediterranean Sea	Porifera	Orani et al., 2020
Halichondria panicea		Suspension	81	23	Killkieran Bay	Porifera	Orani et al., 2020
Halichondria panicea		Suspension	122	9	Killkieran Bay	Porifera	Orani et al., 2020
Hymeniacidon perlevis		Suspension	107	20	Killkieran Bay	Porifera	Orani et al., 2020
Hymeniacidon perlevis		Suspension	170	26	Killkieran Bay	Porifera	Orani et al., 2020
Chlamys nobilis		Filter	60	19	Dapeng Bay	Mollusca	Pan and Wang, 2011
Ruditapes philippinarum		Filter	47	17	Tolo Harbo	Mollusca	Pan and Wang, 2011
Saccostrea cucullata		Filter	70	15	Clear Water Bay	Mollusca	Pan and Wang, 2011
Perna viridis		Filter	30	9	Tolo Harbo	Mollusca	Pan and Wang, 2011
Septifer virgatus		Filter	92	10	Clear Water Bay	Mollusca	Pan and Wang, 2011
Mytilidae spp		Filter	142	79	Eastern U.S.	Mollusca	Chen et al., 2014
Mytilidae spp		Filter		83	Eastern U.S.	Mollusca	V. F. Taylor et al., 2019
Mytilidae spp		Filter	95		Narragansett Bay, RI/MA U.S.	Mollusca	D. L. Taylor et al., 2012
Mytilidae spp		Filter	173		Gulf of St. Lawrence	Mollusca	Cossa and Tabard, 2020
Maldanidae spp.		Deposit	101	70	Minas Basin, Bay of Fundy	Annelida	Sizmur et al., 2013
Maldanidae spp.		Deposit	20		Bay of Fundy, Nova Scotia	Annelida	English et al., 2015
Glyceridae spp.		Predator	37	9	Minas Basin, Bay of Fundy	Annelida	Sizmur et al., 2013
Nereidae spp.		Deposit	139		Narragansett Bay, RI/MA U.S.	Annelida	V. F. Taylor et al., 2019
Nereidae spp.		Deposit	10		Bay of Fundy, Nova Scotia	Annelida	English et al., 2015
Ilyanassa obsoleta		Deposit	177		Narragansett Bay, RI/MA U.S.	Mollusca	V. F. Taylor et al., 2019
Ilyanassa obsoleta		Deposit	60		Gulf of Maine	Mollusca	Chen et al., 2009
Ilyanassa obsoleta		Deposit	40		Bay of Fundy, Nova Scotia	Mollusca	English et al., 2015
Litorrina littorea		Grazer	90		Narragansett Bay, RI/MA U.S.	Mollusca	V. F. Taylor et al., 2019
Litorrina littorea		Grazer		30	Eastern U.S.	Mollusca	V. F. Taylor et al., 2019
Litorrina littorea		Grazer	20		Bay of Fundy, Nova Scotia	Mollusca	English et al., 2015
Corophium volutator		Deposit	43	11	Minas Basin, Bay of Fundy	Mollusca	Sizmur et al., 2013
Corophium volutator		Deposit	10		Bay of Fundy, Nova Scotia	Mollusca	English et al., 2015
Amphipod spp.		Deposit	93		Narragansett Bay, RI/MA U.S.	Arthropoda	V. F. Taylor et al., 2019
Amphipod spp.		Deposit	12		Gulf of Maine	Arthropoda	Chen et al., 2009
Carcinus maenas		Predator	57	42	Eastern U.S.	Arthropoda	Chen et al., 2014
Carcinus maenas		Predator	126		Narragansett Bay, RI/MA U.S.	Arthropoda	V. F. Taylor et al., 2019
Carcinus maenas		Predator		80	Eastern U.S.	Arthropoda	V. F. Taylor et al., 2019
Macoma balthica		Deposit	10		Bay of Fundy, Nova Scotia	Mollusca	English et al., 2015
Balanus balanus	232	Filter	10	3	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2023
Carcinus maenas	291	Predator	32	23	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2023
Corophium volutator	200	Deposit	22	11	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2023
Glyceridae spp.	415	Predator	29	18	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Goniadidae spp.	418	Predator	69	37	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Ilyanassa obsoleta	259	Deposit	139	26	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2023
Lineidae spp.	299	Deposit	31	13	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Litorrina littorea	234	Grazer	60	8	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2023
Macoma balthica	232	Deposit	76	11	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2023
Maldanidae spp.	237	Deposit	45	23	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Mytilus edulis	210	Filter	59	10	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2023
Nereidae spp.	221	Deposit	80	6	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Pagurus acadiarnus	290	Predator	17	7	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2023

Species	**TL**	**FS**	**THg**	**MeHg**	**Location**	**Phylum**	**Reference**
Phyllodocidae spp.	294	Predator	67	18	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2023
Balanus balanus		Filter	7.92	1.87	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Corophium volutator		Deposit	25.28	12.68	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Ilyanassa obsoleta		Deposit	112.43	36.2	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Littorina littorea		Grazer	56.58	10.82	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Nereidae spp.		Deposit	15.16	4.29	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2024
Balanus balanus		Filter	15.87	2.47	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Ilyanassa obsoleta		Deposit	195.39	8.76	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Littorina littorea		Grazer	57.58	5.74	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Mytilus edulis		Filter	62.07	13.97	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Pagurus acadianus		Predator	14.68	4.23	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Corophium volutator		Deposit	23.95	8.68	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Ilyanassa obsoleta		Deposit	161.23	45	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Littorina littorea		Grazer	81.97	3.23	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Nereidae spp.		Deposit	62.8	9.61	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2024
Pagurus acadianus		Predator	18.37	8.59	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Balanus balanus		Filter	6.73	3.86	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Corophium volutator		Deposit	19.59	9.94	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Ilyanassa obsoleta		Deposit	116.3	17.6	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Littorina littorea		Grazer	50.88	9.53	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Mytilus edulis		Filter	56.3	7.33	Minas Basin, Bay of Fundy	Mollusca	Bradford et al., 2024
Pagurus acadianus		Predator	14.3	4.75	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Corophium volutator		Deposit	21.24	12	Minas Basin, Bay of Fundy	Arthropoda	Bradford et al., 2024
Nereidae spp.		Deposit	95.66	4.75	Minas Basin, Bay of Fundy	Annelida	Bradford et al., 2024
Acanthostepheia behringiensis (l)	350	Deposit		80	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Acanthostepheia behringiensis (l)	310	Deposit		62	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Acanthostepheia behringiensis (s)	220	Deposit		9	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Ampelisca spp.	210	Deposit		4	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Anonyx nugax	370	Deposit		231	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Arctolembos arcticus	220	Deposit		7	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Paramphithoe sp.	330	Deposit		127	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Pleustes panoplus	270	Deposit		21	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Rhachotropis aculeata	310	Deposit		55	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Unidentified amphipod sp.	340	Deposit		79	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Diastylidae sp.	200	Deposit		8	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Diastylidae sp.	190	Deposit		12	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Munnopsis typica	270	Deposit		29	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Saduria entomon	310	Deposit		53	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Saduria sabini	350	Deposit		39	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Saduria sabini	280	Deposit		47	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Synidotea bicuspida	310	Deposit		19	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Synidotea bicuspida	290	Deposit		28	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Eualus gaimardii	350	Generalist		52	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Eualus gaimardii	340	Generalist		106	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Sabinea septemcarinata	330	Generalist		35	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Sabinea septemcarinata	350	Generalist		93	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Spirontocaris sp.	300	Generalist		134	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
Nymphonidae sp.	340	Predator		32	Cape Bathurst (CB)	Arthropoda	McClelland et al., 2024
Nymphonidae sp.	390	Predator		299	Mackenzie Trough (MT)	Arthropoda	McClelland et al., 2024
	330	Filter feeder		29	Cape Bathurst (CB)	Cnidaria	McClelland et al., 2024
	330	Filter feeder		38	Mackenzie Trough (MT)	Cnidaria	McClelland et al., 2024
Gersemia rubiformis	260	Filter feeder		17	Mackenzie Trough (MT)	Cnidaria	McClelland et al., 2024
Crossaster papposus	350	Predator		367	Mackenzie Trough (MT)	Echinodermata	McClelland et al., 2024
Leptasterias littoralis	270	Predator		66	Cape Bathurst (CB)	Echinodermata	McClelland et al., 2024
Leptasterias spp.	290	Filter feeder		244	Mackenzie Trough (MT)	Echinodermata	McClelland et al., 2024
Ophiocten sericeum	240	Deposit		8	Cape Bathurst (CB)	Echinodermata	McClelland et al., 2024
Ophiocten sericeum	260	Deposit		14	Mackenzie Trough (MT)	Echinodermata	McClelland et al., 2024
Ophiacantha bidentata	340	Deposit		42	Mackenzie Trough (MT)	Echinodermata	McClelland et al., 2024
Stegophiura nodosa	280	Deposit		13	Cape Bathurst (CB)	Echinodermata	McClelland et al., 2024
Psolus sp.	220	Filter		17	Mackenzie Trough (MT)	Echinodermata	McClelland et al., 2024
Amphiporus sp.	280	Deposit		34	Cape Bathurst (CB)	Nemertea	McClelland et al., 2024
Unidentified sipunculid sp. A	**110**	Deposit		1.5	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Unidentified sipunculid sp. A	**130**	Deposit		1.5	Mackenzie Trough (MT)	Annelida	McClelland et al., 2024
Bylgides sp.	340	Predator		24	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Bylgides sarsi	300	Predator		54	Mackenzie Trough (MT)	Annelida	McClelland et al., 2024
Gattyana cirrhosa	*320*	Predator		69	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Harmothoe imbricata	*310*	Predator		40	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Nephtys sp.	***290***	Predator		149	Mackenzie Trough (MT)	Annelida	McClelland et al., 2024
Nereis zonata	*230*	Deposit		20	Mackenzie Trough (MT)	Annelida	McClelland et al., 2024
Pectinaria hyperborea	*190*	Deposit		48	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Phyllodoce groenlandica	*210*	Predator		41	Cape Bathurst (CB)	Annelida	McClelland et al., 2024
Unidentified polychaete sp.*	220	Predator		22	Mackenzie Trough (MT)	Annelida	McClelland et al., 2024
Astarte borealis	**250**	Filter		32	Cape Bathurst (CB)	Mollusca	McClelland et al., 2024
Astarte spp	270	Filter		36	Cape Bathurst (CB)	Mollusca	McClelland et al., 2024
Astarte spp	250	Filter		59	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Clinocardium ciliatum	250	Filter		71	Cape Bathurst (CB)	Mollusca	McClelland et al., 2024
Clinocardium ciliatum	260	Filter		173	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Cyclocardia sp.	*180*	Filter		89	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Nuculana pernula	**240**	Deposit		47	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Similipecten greenlandicus	*290*	Deposit		76	Cape Bathurst (CB)	Mollusca	McClelland et al., 2024
Similipecten greenlandicus	*290*	Deposit		146	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Yoldia hyperborea	*220*	Deposit		15	Cape Bathurst (CB)	Mollusca	McClelland et al., 2024
Boreotrophon truncatus	260	Predator		10	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Buccinum polare	300	Predator		172	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Buccinum spp.	260	Predator		89	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Cryptonatica sp.	280	Predator		141	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Cylichna sp.	220	Predator		26	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Margarites costalis	290	Deposit		61	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Neptunea sp.	280	Predator		268	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024
Tachyrhynchus spp.	140	Predator		14	Mackenzie Trough (MT)	Mollusca	McClelland et al., 2024

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