Response to reviewers’ comments

**Date**: August 2, 2021

**Manuscript Number**: ERE-2021-0114

**Title of Article**: Idea paper: An experimental framework for determining the degree of intraguild predation in a three-species omnivorous food web

**Corresponding Author**: Gen-Chang Hsu

**Email**: [genchanghsu@gmail.com](mailto:genchanghsu@gmail.com)

----------------------------------------------------------------------------------------------------

Dear Dr. Yoshihisa Suyama and Dr. Takeshi Osawa,

Thanks you for inviting me to submit a revised version of the manuscript. I greatly appreciate the valuable comments and suggestions from the reviewers. The thorough review and the revision made accordingly have substantially improved this manuscript. I have carefully considered the comments and provided my point-by-point responses in the following. For convenience, all changes to the original manuscript are tracked in the MS Word document, and the line numbers in the responses refer to the ones in the revised manuscript (final without markup).

I have made the following major changes in this revised manuscript according to the editors’ and reviewers’ comments:

* Revised the “Relevant hypothesis” section by referring to Rickers et al’s (2006) study
* Revised the “New research idea” section by clarifying the principal idea of the proposed framework
* Revised the proposed framework in the “How to tackle the question through the proposed new idea” section
* Revised the “Motivation” section
* Modified the contents and the font sizes of the original “Figure 1”
* Added “Figure 2” showing a hypothetical example of data collection in the feeding trial for standard curve construction

All details of these changes are provided in the following responses.

Sincerely,

Gen-Chang Hsu

Department of Life Science, National Taiwan University

Email: [genchanghsu@gmail.com](mailto:genchanghsu@gmail.com)

----------------------------------------------------------------------------------------------------

**Handling Editor Comments to Author:**

**Comment** > Thank you for submitting your manuscript to Idea Paper section in Ecological Research. Please follow the reviewer's comments and revise them carefully.

**Response** > Yes, I have carefully considered the editors’ and reviewer's comments and provided my detailed point-by-point responses in the following.

**Comment** > The following are my main comments. As pointed out by Reviewer 1, the idea of measuring IGP intensity using stable isotopes and feeding experiments has already been proposed. Please explain clearly how the idea of the proposed method is different from previous method (e.g., Rickers et al. 2006)? Alternatively, if the idea of the proposed method is not new, please explain what new ideas (hypotheses) can be tested by the proposed method? If so, I think the manuscript needs to be completely revised.

**Response** > I have provided detailed responses to reviewer 1’s comments in the below section. Here I will just briefly summarize the major differences between Rickers et al.’s (2006) method and the proposed idea in this paper:

* Rickers et al.’s study used artificially-13C-enriched shared prey in the feeding experiments, whereas this paper analyzes the natural abundances of 15N of the focal organisms.
* Rickers et al.’s study tested the effects of different treatments (absence/presence of shared prey and habitat structure) on IGP under lab conditions, whereas this paper examines the degree of IGP in the field via an experimentally-derived standard curve.
* Rickers et al.’s study used a fixed diet with a constant level of three shared prey and six mesopredator individuals in the feeding experiment, whereas this paper uses mixed diets with different proportions of shared prey and mesopredator individuals in the feeding experiment.
* Rickers et al.’s study provided only “qualitative” inferences about IGP, whereas this paper can “quantify” the degree of IGP in the field.

I have also revised part of the original manuscript according to reviewer 1’s comments. Please see the below section for more details.

----------------------------------------------------------------------------------------------------

**Reviewer 1's Comments to Author:**

This idea paper deals with the method to quantify the degree of intraguild predation using feeding experiments and stable isotope techniques. As the author clearly mentioned in the sections of Research question and Value, it is important to estimate the degree of IGP to better understand the effects of predators on trophic dynamics in a field. However, the effects of IGP on stable isotopes of predators (spiders) have been investigated by earlier studies (Rickers et al., 2006; Sanders & Platner, 2007; Wise et al., 2006). In particular, Rickers et al. (2006) performed a feeding experiment and measurements of the isotope ratio of spiders in the laboratory to examine IGP. Therefore, the statement “this proposal has not been experimentally verified” (Line 68) seems incorrect, and the research idea proposed by the author does not appear to be new. I think that the authors would need to modify the two sections of Relevant hypothesis and New research idea by referring to the earlier studies on the effects of IGP on isotopes. Further, it is unclear how the top predator could be controlled to feed on mixed diets with the various proportions (Lines 99-102). Even if mixed diets with a certain proportion (e.g., 25% vs 75%) were provided, it would be unlikely that the top predator feeds on the diets with the proportion as expected. I suppose that it may be helpful to use 13C-labeled diets as previously done by Rickers et al. (2006).

Rickers, S., Langel, R., & Scheu, S. (2006) Stable isotope analyses document intraguild predation in wolf spiders (Araneae : Lycosidae) and underline beneficial effects of alternative prey and microhabitat structure on intraguild prey survival. Oikos, 114, 471-478.

Sanders, D. & Platner, C. (2007) Intraguild interactions between spiders and ants and top-down control in a grassland food web. Oecologia, 150, 611-624.

Wise, D.H., Moldenhauer, D.M., & Halaj, J. (2006) Using stable isotopes to reveal shifts in prey consumption by generalist predators. Ecological Applications, 16, 865-876.

**Comment** > This idea paper deals with the method to quantify the degree of intraguild predation using feeding experiments and stable isotope techniques. As the author clearly mentioned in the sections of Research question and Value, it is important to estimate the degree of IGP to better understand the effects of predators on trophic dynamics in a field.

**Response** > Thanks for pointing out the value and importance of this paper. If the proposed experimental framework is proven successful, it will allow researchers to gain deeper insights into trophic interactions and food web dynamics in the field.

**Comment** > However, the effects of IGP on stable isotopes of predators (spiders) have been investigated by earlier studies (Rickers et al., 2006; Sanders & Platner, 2007; Wise et al., 2006). In particular, Rickers et al. (2006) performed a feeding experiment and measurements of the isotope ratio of spiders in the laboratory to examine IGP. Therefore, the statement “this proposal has not been experimentally verified” (Line 68) seems incorrect, and the research idea proposed by the author does not appear to be new. I think that the authors would need to modify the two sections of Relevant hypothesis and New research idea by referring to the earlier studies on the effects of IGP on isotopes.

**Response** > Thanks for referencing the important previous works on examining IGP using stable isotopes (Rickers et al., 2006; Sanders & Platner, 2007; Wise et al., 2006). I acknowledged that similar idea has already been put forward by previous researchers, and so the original statement “this proposal has not been experimentally verified” seem to be over-assertive. I have now revised it as “..., yet few studies have experimentally verified this proposal.” (Line 69). I have also added these references in the “Relevant hypothesis” section in the revised manuscript (Line 67 and 71).

I have carefully read through the article by Rickers et al. (2006), which the reviewer has particularly brought up in the comment. There are a few distinctions I would like to clarify between Rickers et al.’s (2006) method and the proposed idea herein:

1. The main objective of Rickers et al.’s (2006) study is to examine the effects of manipulating the shared prey availability (with vs. without *Drosophila melanogaster*) and microhabitat structure (simple vs. complex) on IGP under lab conditions. They used artificially-13C-enriched shared prey in their feeding experiments and analyzed the resulting carbon isotope ratios of top predators to make inferences about IGP under different treatments. In contrast, the main purpose of this paper is to experimentally establish a standard curve and analyze the natural abundances of nitrogen stable isotopes of field samples to determine the degree of IGP under field conditions. (Also see my response to the last comment by reviewer 1, where the reviewer suggested that it may be helpful to use 13C-labeled diets.)

2. Rickers et al.’s (2006) study did not present top predators with mixed diets containing different proportions of shared prey and mesopredator but instead a fixed diet (a constant level of three shared prey and six mesopredator individuals). In fact, Rickers et al. did reveal significantly lower carbon isotope ratios of top predators in the presence vs. absence of IGP (Figure 5a in their study), but they did not “quantify” the degree of IGP because their diet treatment was binary (with vs. without mesopredator). They were only able to document the “occurrence” of IGP but no further quantitative information was provided. On the contrary, in this paper the top predator individuals are fed different proportions of mixed diets, allowing for simulating a full range of encounter rates that the focal organisms might experience in the field. The degree of IGP (proportion of mesopredator consumed in the diet of top predator) can then be determined via the standard curve and field samples of focal organisms.

3. Rickers et al.’s (2006) study also showed that top predators had higher δ15N in the presence vs. absence of IGP (figure 5b in their study), consistent with previous studies suggesting that IGP may result in higher δ15N of top predators. However, again, this was only a qualitative inference about IGP. On the other hand, in this paper, the degree of IGP can be quantified using the field-derived δ15N of top predators.

In summary, although this paper shares the similar concept of using stable isotope analysis to examine IGP with Ricker’s et al.’s study, the objective and the implementation details of the methods in this paper are quite different from theirs. In particular, this paper combines feeding experiments and analysis of natural abundances of nitrogen stable isotopes to determine the degree of IGP in the field, whereas Ricker’s et al.’s study conducted feeding experiments with carbon-isotope-enriched organisms to test the effects different treatments on IGP.

**Comment** > Further, it is unclear how the top predator could be controlled to feed on mixed diets with the various proportions (Lines 99-102). Even if mixed diets with a certain proportion (e.g., 25% vs 75%) were provided, it would be unlikely that the top predator feeds on the diets with the proportion as expected.

**Response** > Thanks for pointing out this important issue. The main purpose of feeding the top predator mixed diets with different proportions of shared prey and mesopredator is to simulate a full range of potential encounter rates that the focal organisms may experience in the field. However, as mentioned in the comment, the proportions of the shared prey and mesopredator actually consumed by the top predator may not necessarily follow the presented proportions in the mixed diet. Therefore, a better way to construct the standard curve is to use the consumed proportions rather than the presented proportions. I have revised the “How to tackle the question through the proposed new idea” section by adding the following sentence: “A standard curve can be constructed by plotting the Δ15N of top predator against the proportion of mesopredator consumed (Fig. 1d)” (Line 115-116). I have also modified the X-axis in the original figure 1d accordingly and provided a new figure 2 showing a hypothetical example of data collection in the feeding trial for standard curve construction.

**Comment** > I suppose that it may be helpful to use 13C-labeled diets as previously done by Rickers et al. (2006).

**Response** > Rickers et al. (2006) used 13C-enriched shared prey as the diet for the mesopredator and top predator to track IGP. The main advantage of this method is that it allows for strong inferences about IGP from the artificially-created distinct isotope signatures. However, this method may not be practicable in the field. Unlike under lab conditions where the artificial isotopic enrichment can be well controlled for only the shared prey but not the mesopredator, under field conditions not only the shared prey will show enriched isotope signals but also the mesopredator and top predator will get enriched through feeding on the shared prey. If the enriched signals become similar among the shared prey/mesopredator/top predator, then it might not be possible to study IGP with this method (or it might lead to incorrect inferences about IGP). Therefore, to examine the degree of IGP under field settings, natural abundances of isotopes (particularly 15N) would be more appropriate.

----------------------------------------------------------------------------------------------------

**Reviewer 2’s Comments to the Author**

Rating method

For each question, grade 0(No), 1, 2, 3 (Completely Yes), or N/A  
For each question, reviewers should explain their answers and may point out any related issues (if any).  
  
[1] Is the title appropriately reflecting the content of the paper?

3

[2] Is the systematic keyword selection appropriate?

**Comment** > 2. “ideas for fundamental question” might be odd here.

**Response** > I have replaced the original key word “ideas for fundamental question” with the new one “ideas for specific organisms/systems”, which matches better the topic of this study (i.e., IGP in three-species omnivorous food web as a specific system) (Line 34).

[3] Is the research question specified?

**Comment** > 1. There is an established method for estimating trophic position using stable isotope technique (Post 2002, Ecology). What is the difference between the previous method and the proposed method? See my main review text below.

**Response** > I have provided my response below.

[4] Is the value of solving the question specified? Subjective assessments of ecological significance of the proposed new idea are not a part of evaluation.

3

[5] Are relevant papers cited and are their interpretations and criticisms appropriate?

**Comment** > 1. See [3] and my main review text.

**Response** > I have provided my response below.

[6] Is the idea concrete? Isn’t it just reinvention of the ideas that have been proved to be invalid in the research field?

**Comment** > 1. See my main review text.

**Response** > I have provided my response below.

[7-1] Are appropriate papers cited, which are linked to the proposed idea? Is the summary of similarities or dissimilarities clear?

**Comment** > 1. No, see my main review text.

**Response** > I have provided my response below.

[7-2] Are methods and techniques specifically provided for testing the proposed idea?

**Comment** > 1. No. I have many concerns. See my main review text.

**Response** > I have provided my response below.

[8] Is Motivation section clearly describing the authors’ motivations for sharing the proposed idea?

**Comment** > 2. Author’s motivation was described, although it seems weakly link to conceptual motivation.

**Response** > I think the main source of motivation for me to work on this idea is that I would like to find a way to quantify the degree of IGP in the field and solve the questions in my mind for long. Therefore, it might seem a bit weak when it comes to “conceptual” motivation. Nonetheless, I hope this paper can serve as a starting point to generate new ideas refining the proposed framework herein, or even inspire other researchers to develop a more thorough method to better address this question. If so, I think it will be the most valuable part of this paper.

---  
Main review text  
---

**Comment** > This idea paper proposes an experimental method to determine the degree of intraguild predation (IGP) by using stable isotope technique. The proposed method is an application of the existing methodology that uses stable isotope signatures to estimate the trophic positions of predators (Post 2002, Ecology). The unique features of the proposed method may be twofold: (1) it estimates the trophic enrichment factor (TEF) between shared prey and top predator, the TEF between between mesopredator and shared prey, and the TEF between mesopredator and top predator, and (2) it experimentally supplies top predators with mixed diets composed of different proportions of shared prey and mesopredator. This experiment yields a standard curve for the relationship between the degree of IGP and the degree of trophic enrichment from shared prey to top predators. The author proposes that the standard curve can be used to evaluate the degree of IGP in top predators collected from the field.

**Response** > Thanks for pointing out the significance of this paper. Indeed, part of the proposed idea has been based on previous concepts and knowledge regarding isotopic enrichment across trophic levels (e.g., Post 2002). However, previous studies on trophic level/position estimation mainly relied on assumed trophic enrichment factors (TEFs) from available published data (e.g., a mean value of 3.4‰ for 15N). Since TEFs are quite taxon-specific and trophic level estimation is sensitive to TEF inputs (Post 2002), this could potentially lead to incorrect trophic level estimates and thus the inferences about IGP.

In this regard, the proposed framework incorporates controlled feeding trials, allowing for system-specific trophic enrichment among the interacting organisms and thus yielding more accurate TEFs. In addition, the proposed framework does not aim at using TEFs to estimate trophic positions of top predator (which are then used for “indirect” inferences about IGP), but rather using TEFs to “directly” quantify the degree of IGP in the field using an experimentally-derived standard IGP curve.

Overall, I have quite a few concerns on the proposed method.

**Comment** > (1) Although I understand the idea behind this method, I am not convinced why a standard curve is necessary. Without a standard curve, a linear isotope mixing model can estimate the degree of IGP if the TEFs are available for all trophic links and the isotope signatures of all trophic species. Why is a standard curve necessary?

**Response** > I have two things to clarify regarding the questions raised (why not use stable isotope mixing model and why a standard curve is necessary):

1. Yes, if TEFs are available for all trophic links and the isotopic signature of the prey items are distinct enough, a stable isotope mixing model can accurately determine the proportional contributions of different prey sources to a predator’s diet in terms of dry biomass. However, such proportions from the mixing model may not necessarily reflect the proportions of different prey sources consumed in the predator’s diet in terms of numbers, due to the fact that the dry biomass of prey sources might differ substantially. For example, assume that prey A and prey B have a per capita dry biomass ratio of 1:2. When a predator consumes one prey A and one prey B, the proportional contribution of prey A vs. prey B estimated from the mixing model would be 33% vs. 67%, not 50% vs. 50%. Therefore, if we base our results on mixing model estimates, then we could potentially mistake the proportions of actual prey numbers consumed.

I acknowledged that I did not define precisely “the degree of IGP” in the original manuscript, which may have caused the confusions regarding whether the degree means proportions in dry biomass or proportions in numbers. I have revised the “Research question” section and made clear that “the degree of IGP” refers to the proportions of mesopredator consumed in numbers, not in dry biomass. Of course, both measures (dry biomass or numbers) have their own ecological meanings and represent different aspects of predator-prey trophic interactions. Nonetheless, it is the numbers, not the dry biomass of prey consumed by the top predator, that are of more relevance when it comes to how IGP may affect the population dynamics of the shared prey and mesopredator.

2. A standard curve is needed because it is generally not possible to directly record the proportions of shared prey and mesopredator consumed in top predator’s diet in the field. The purpose of such a standard curve is to experimentally establish the relationship between the proportion of mesopredator individuals consumed and the nitrogen isotopic enrichment of top predator, so that we can back-estimate the proportion of mesopredator consumed by the top predator in the field using the field-collected nitrogen isotopic enrichment data.

**Comment** > (2) A standard curve can be necessary if isotope mixing is non-linear. Is there any reason that suggests nonlinear isotope mixing?

**Response** > There hasn’t been much previous research on the mechanisms for non-linear isotope mixing in ecology (I have listed below a few references on this topic I found), but such non-linearity can potentially arise when prey sources exhibit temporal variations in C/N ratios, the trophic enrichment factors are not constant but rather proportion-dependent, or some important contributing sources are missing in the model.

That said, the issue of non-linearity should not be a major concern in this paper because the proposed framework does not rely upon stable isotope mixing models to determine the degree of IGP. In addition, as mentioned in the comments, even if non-linear isotope mixing does occur in the system, a standard curve can take into account this effect. In regard to comment (1), this again adds to the usefulness of standard curve in the proposed framework.

Logan, J. M., Jardine, T. D., Miller, T. J., Bunn, S. E., Cunjak, R. A., & Lutcavage, M. E. (2008). Lipid corrections in carbon and nitrogen stable isotope analyses: comparison of chemical extraction and modelling methods. *Journal of Animal Ecology*, *77*(4), 838-846.

Walther, B. D., & Nims, M. K. (2015). Spatiotemporal variation of trace elements and stable isotopes in subtropical estuaries: I. Freshwater endmembers and mixing curves. *Estuaries and Coasts*, *38*(3), 754-768.

**Comment** > (3) Although it is not clearly stated, I assume that all diets presented to top predators are consumed by them. Alternatively, the proportions of consumed mesopredator and shared prey should be plotted on the X axis (rather than the presented proportions).

**Response** > Thanks for pointing out this important issue. Yes, originally I thought that the diet items presented to the top predator would be fully consumed, and so the presented proportions (of mesopredator in the mixed diet) can be directly plotted on the X-axis. However, this might not always be the case. Therefore, as suggested, a better way to construct the standard curve is to replace the presented proportions with the consumed proportions. I have revised the “How to tackle the question through the proposed new idea” section by adding the following sentence: “A standard curve can be constructed by plotting the Δ15N of top predator against the proportion of mesopredator consumed (Fig. 1d)” (Line 115-116). I have also modified the X-axis labels in figure 1d accordingly.

**Comment** > (4) It should be made sure that mesopredator does not feed on shared prey when top predator is fed with the mixture diet of mesopredator and shared prey. Otherwise, the proportion of shared prey and mesopredator can change.

**Response** > Yes, thanks for bringing up this nice point. One possible workaround is to remove the feeding apparatus of the mesopredator to prevent it from capturing the shared prey. Yet, the exact solution to this problem may vary depending on the study systems and the organisms involved.

**Comment** > (5) If there is any difference in the proportions of mesopredator and shared prey between presented and consumed diets (for example, if top predators have biased preference), the relationship between top predator’s trophic enrichment and presented diet proportion can be nonlinear. However, the degree of IGP should be based on consumed proportion rather than presented proportion.

**Response** > Yes, I totally agreed. The standard curve should be constructed using the actual proportions consumed rather than the presented proportions (as also raised in comment [3]). The main purpose of different presented proportions in the diet treatment is to simulate a full range of potential encounter rates that the focal organisms may experience in the field, but it is the consumed proportions that actually represent the degree of IGP (also see my response to comment [3]).

**Comment** > (6) The term, trophic enrichment factor (TEF), usually refers to the amount of isotope enrichment per single trophic link. Sometimes (lines 105-110), the author uses TEFs to mean the degree of trophic enrichment via multiple trophic links.

**Response** > Yes, strictly speaking, the term “trophic enrichment factor” refers to isotope enrichment for a single trophic link. However, in a broader sense, it simply represents the arithmetic difference in the isotope ratios of consumer and diet not restricted to a single trophic link (Newton 2016). To avoid confusions, in the revised manuscript, I have used the notation “Δ15N” instead of “TEFs” to indicate the difference in δ15N between the top predator and the shared prey (Line 93-94).

Another point I would like to mention is that multiple terms have been used interchangeably to describe the amount of isotopic enrichment between trophic links, for example, trophic enrichment factors, trophic discrimination factors, and trophic fractionation factors (e.g., see Holá et al. 2015). Although these terms are generally synonymous with each other, I have decided to use “trophic discrimination factors (TDFs)” in the revised manuscript following Caut et al. (2009) in substitution for the original “trophic enrichment factors (TEFs)” (Line 72-76).

Caut, S., Angulo, E., & Courchamp, F. (2009). Variation in discrimination factors (Δ15N and Δ13C): the effect of diet isotopic values and applications for diet reconstruction. *Journal of Applied Ecology*, *46*(2), 443-453.

Holá, M., Ježek, M., Kušta, T., & Košatová, M. (2015). Trophic discrimination factors of stable carbon and nitrogen isotopes in hair of corn fed wild boar. *PloS one*, *10*(4), e0125042.

Newton, J. (2016). Stable isotopes as tools in ecological research. *eLS*, 1-8.

**Comment** > (7) The author seems to have a specific system in mind for this method to be applicable. If there is any reason that the author believes that this method is suitable for such a specific system, explaining the reasoning might increase the strength of the proposed method. For example, although readers might be afraid that additional species not considered in the experiment might occur in a real system and feed top predator and mesopredator, are such additional species are rare in the specific empirical system of the author?

**Response** > Yes, I did have a particular system (which is the agricultural systems) in mind when developing the idea and formulating the experimental framework. So although the underlying principle can be applied to any systems, the current framework might be more suitable (or practicable) for food webs in agricultural systems. In fact, I have pointed this out in the “How to tackle the question through the proposed new idea” section in the original manuscript (also see the last paragraph in the revised manuscript).

As specified in the title, the proposed framework focuses on a three-species omnivorous food web while the effects of any other species on the focal organisms are ignored, which may not be realistic in the real world, especially in natural systems where there are often multiple organisms interacting with each other. On the other hand, the proposed framework would be more applicable in agricultural systems, in which the species compositions are relatively simple. For example, the grazing food webs in agro-ecosystems generally consist of crop plant, one dominant prey (usually the pest herbivores), and one or a few generalist predators (e.g., spiders, ground beetles, and lady beetles) feeding on the dominant prey and meanwhile engaging in IGP. Of course, there could exist even-higher-level predators such as birds that feed on both top predator and mesopredator. But even so, the proposed framework still applies and the proportions of mesopredator consumed by the top predator can still be determined via the standard curve and the nitrogen isotope ratios of the focal organisms. The only difference in the presence vs. absence of bird predation is that the proportion estimates may be different, that is, bird predation may alter the interaction between top predator and mesopredator and thus affect the degree of IGP in the field. But since bird predation *per se* will not change the nitrogen isotope ratios of the predators, the proportion estimates will still be reliable and reflective of field conditions.

When building ecological models, we might seek a simple model in the beginning, examine its performance, and then further refine or modify it to include more terms and complex interactions. Likewise, the proposed framework deals with a three-species omnivorous food web, which is the most basic form of IGP. If the present framework works reasonably well and is validated in the field, then we can further incorporate the effects of other species (e.g., a second shared prey, a third predator feeding on both top predator and mesopredator) into the framework to make it more realistic.

**Comment** > (8) The author mentioned his/her paper published in Ecosphere, although no reference information is provided.

**Response** > I have revised the “Motivation” section, and in this revision I decided to remove the original parenthesized text “(published in the journal *Ecosphere*)”. Still, I would love to provide the article information here for your reference:

Hsu, G.-C., J.-A. Ou, and C.-K. Ho. 2021. Pest consumption by generalist arthropod predators increases with crop stage in both organic and conventional farms. Ecosphere 12(7):e03625. 10.1002/ecs2.3625

Here is a copy of the revised “Motivation” section:

“In my previous study, I have been using stable isotope analysis to quantify the diet compositions of generalist arthropod predators in rice agro-ecosystems, and a few reviewers expressed the concern over whether IGP would affect the diet compositions of predators. In fact, IGP may occur among the predators in our system, but we were not able to quantify that due to the limitations of stable isotope mixing models. This question really puzzled me at that time and haunted my mind for long. After doing some literature review, I felt that previous studies on IGP have focused mainly on the qualitative aspect of IGP (e.g., how IGP might affect predator-prey population dynamics), yet relatively few have experimentally examined the quantitative aspect of IGP (e.g., how intense IGP is in the system). This eventually brought me to the idea of using controlled feeding experiments along with stable isotope analysis to determine the degree of IGP in the field. Notwithstanding the limitations, I hope the proposed framework can serve as a starting point to generate new ideas refining the present method, or even inspire other researchers to develop a more thorough method to address this question in the future.”

**Comment** > Figure 1: The proposed experiment should be better described. The figure might need revision accordingly.

**Response** > Yes, I have modified the contents of the original figure 1 (in particular panel [d] and [e]) according to the revised proposed framework.

----------------------------------------------------------------------------------------------------

**Copy editor’s Comments to the Authors:**

Dear Authors,

Thank you for submitting your manuscript to our journal.  
  
Text:

**Comment** > Please upload MS Word file.

**Response** > Yes, I have uploaded the revised manuscript as an MS Word document.

**Comment** > Please declare the existence of any conflict of interest in the main text.

**Response** > Yes, I have added the section “Conflict of interest” in the revised manuscript and declared no conflict of interest (Line 157-158).

Figure 1:

**Comment** > Please increase the font size so that the minimum font can be printed more than 8 points in the printed version. The present font sizes are too small.

**Response** > Yes, I have increased the font size in the original figure 1 to make the text legible when printed. I have also ensured the legibility of the newly-added figure 2.

We look forward to receiving your revised manuscript. Thank you.  
Sincerely,

Copy editor