Results

Nick

# Results

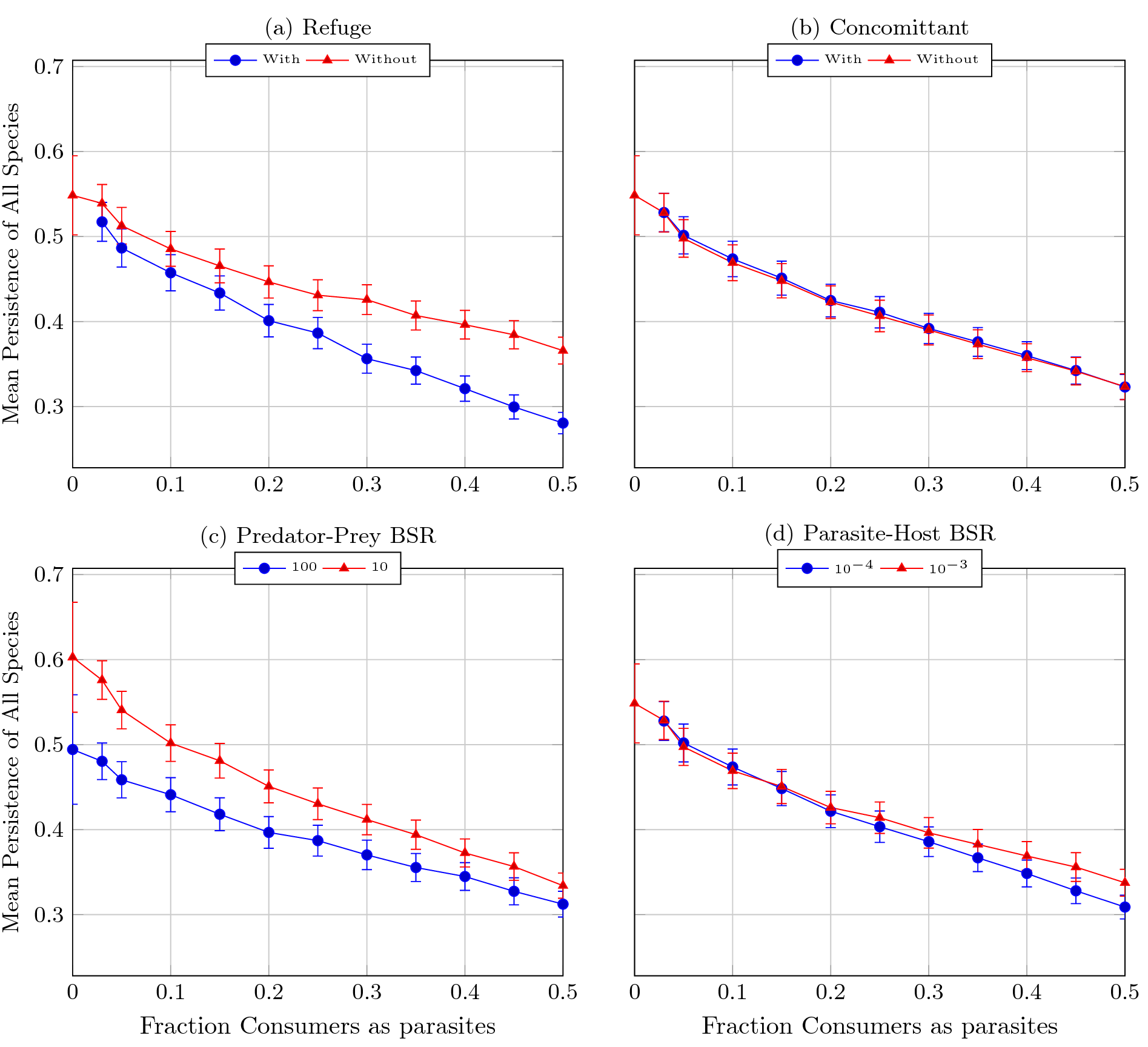
## Disruption of Food Webs

Averaging across all 100 webs, we observed a decrease in overall persistence with increasing fractions of consumers as parasites (figure [fig:perAllSplit]). We also observed an overall decrease in average biomass with increasing fractions of parasitism (figure [fig:totalBioSplit]). This is partly due to the much lower persistence of parasites compared to the overall persistence in the foodweb (figure [fig:perParaSplit]) and the persistence of free-living consumers (figure [fig:perFreeSplit]). Thus, parasites negatively impacted both the number of consumer species and the total biomass of those species. Basal species almost never went extinct (never in webs with free-liver consumer-resource body size ratio of 10, and in fewer than 5% of simulations with that ratio at 100) and on average maintained a constant level of biomass across different levels of parasitism. This suggests that the final, stable (in terms of species extinction) web configurations for all models require a relatively fixed quantity of basal biomass and could imply bottom-up control of food webs.[[1]](#footnote-23) Somewhat surprisingly, inflicting concomittant losses on the parasites had little impact on the average parasitic persistence (figures [fig:perParaSplit-b], [fig:perParaDiff]) or average parasitic biomass (figures [fig:totalBioSplit-c], [fig:totalBioSplit-d]). This is likely because parasites of a particular host are able to exert much higher pressure on that host than other free-living predators of that host due to the parasites’ much higher metabolic rates. Concomittant losses for a parasite are directly tied to the ability of free-living consumers to consume the parasite’s hosts. A parasite will always be able to extract more biomass from its host than the consumers of its host.[[2]](#footnote-24)

In contrast to the effects of concomittant losses, the addition of a host-refuge (that is, protecting parasites from predation when they are within hosts) is very disruptive to persistence (figure [fig:perAllSplit-a]). Host refuge has little effect on food web biomass (figures [fig:totalBioSplit-a] and [fig:totalBioSplit-b]), even at high levels of parasitism. This could suggest an underlying biomass distribution and web configuration determined solely by body sizes. Another striking pattern is the importance of free-living body size ratios. Though the webs with a predator-prey body size ratio of 10 had higher persistence on average (figure [fig:perAllSplit-c], they had much lower biomass across all species types (figures [fig:totalBioSplit-e] and [fig:totalBioSplit-f]). This difference became less pronounced at higher levels of parasitism. Parasite-host body size ratios had little effect on the overall persistence of the web, but smaller parasites on average resulted in less biomass and lower parasite persistence.

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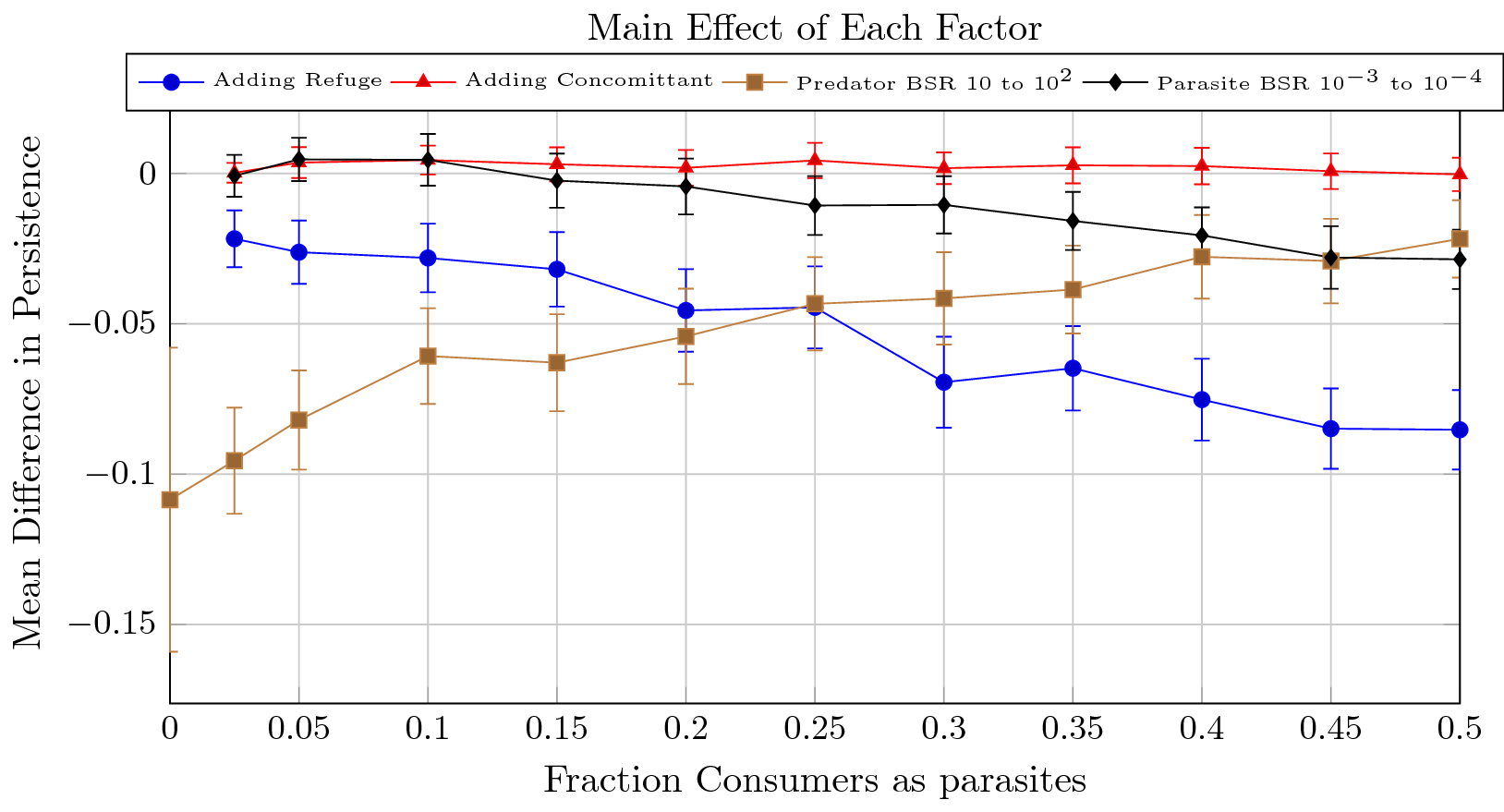
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This figure shows the persistence at each level of each factor, averaged over each other factor (). Each dot represents the average persistence over all webs and all other factors. Error bars represent Bonferroni corrected 95% confidence intervals (). [fig:perAllSplit]

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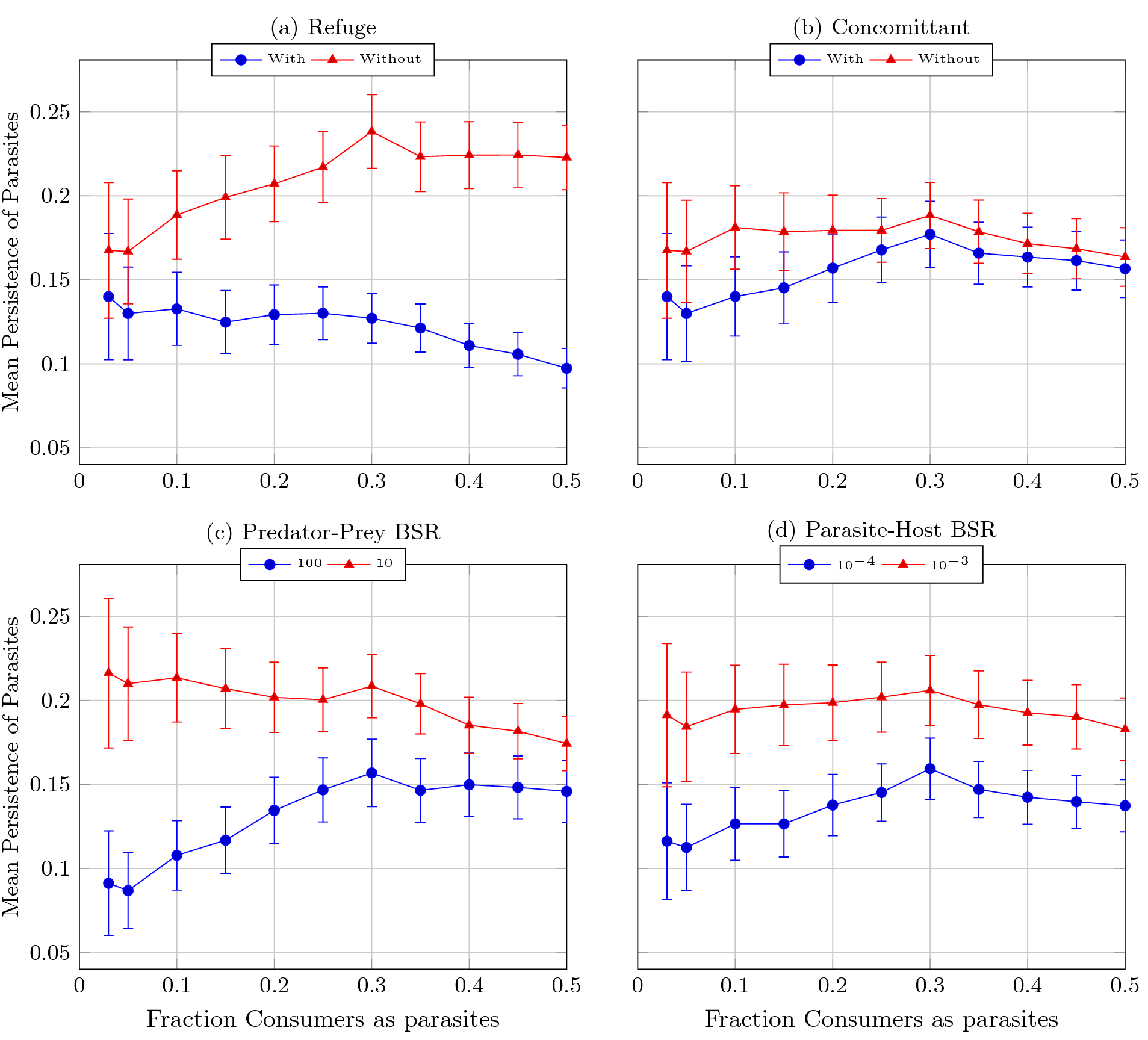
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This figure shows the main effect of each factor on overall persistence. Dots represent the average change in persistence over all webs after making the specified change (), error bars represent Bonferroni-corrected 95% confidence intervals ().[fig:perAllDiff]

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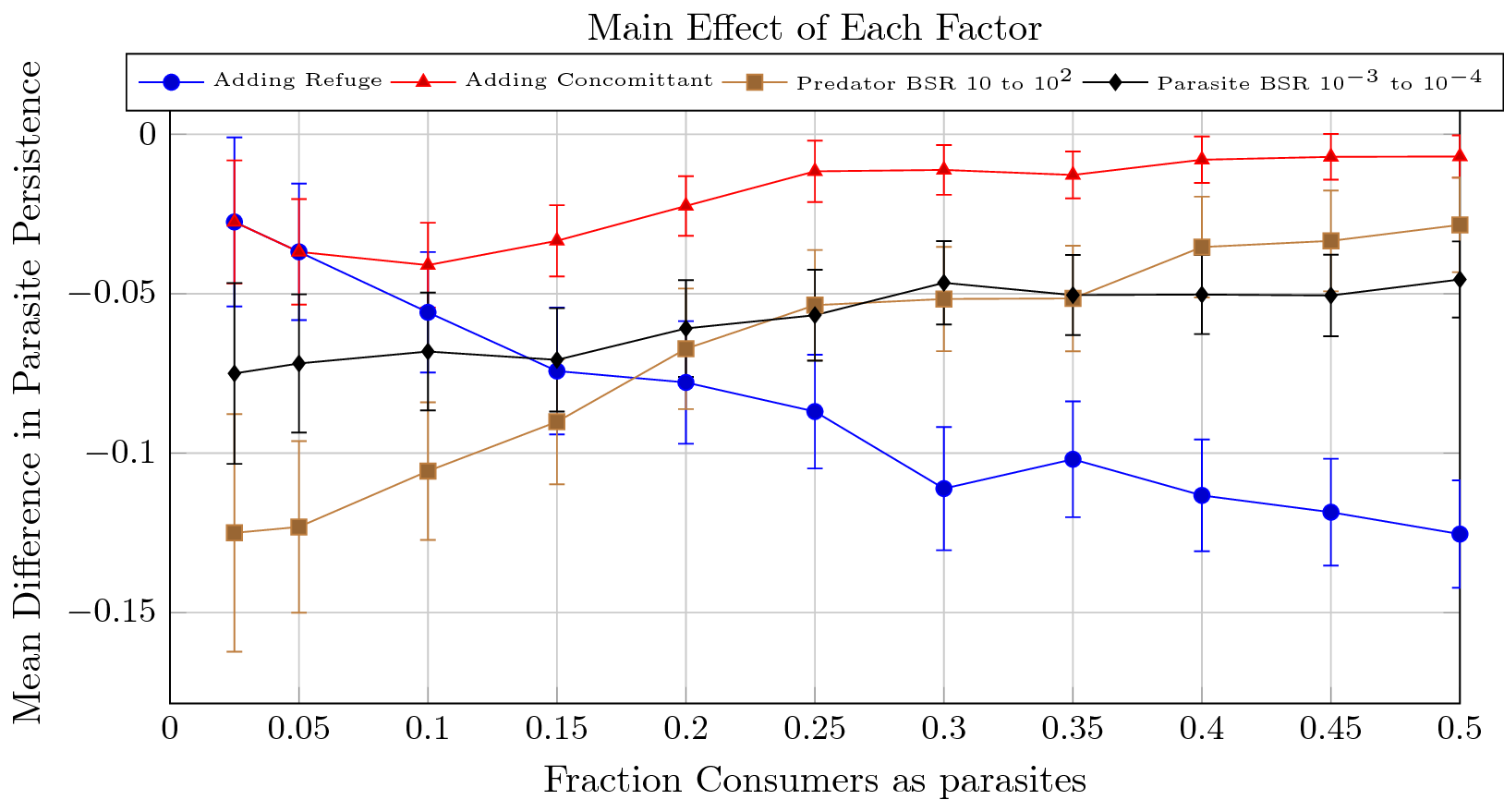
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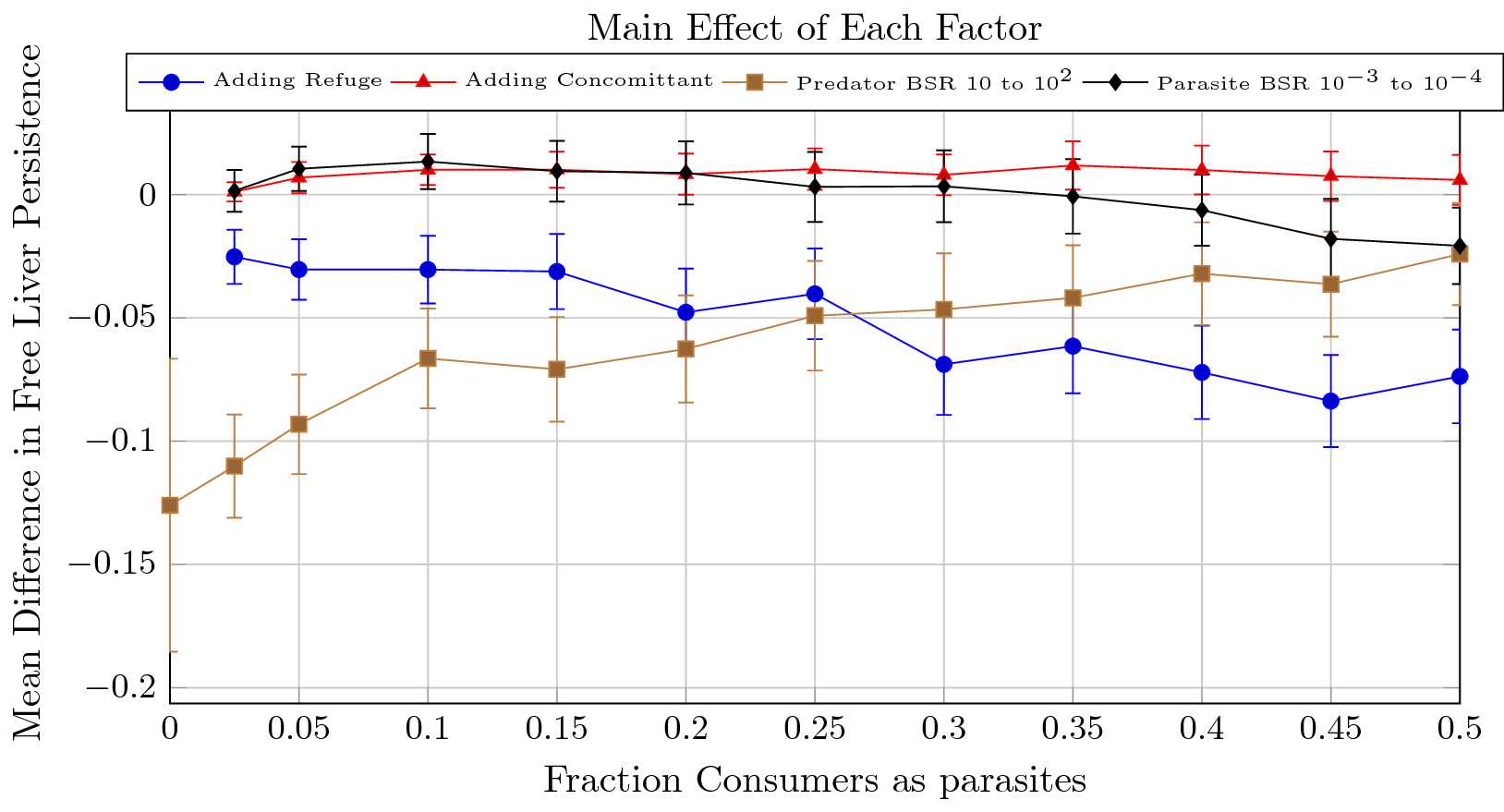
This figure shows the persistence of parasites at each level of each factor, averaged over each other factor (). Each dot represents the average persistence over all webs and all other factors. Error bars represent Bonferroni corrected 95% confidence intervals (). [fig:perParaSplit]

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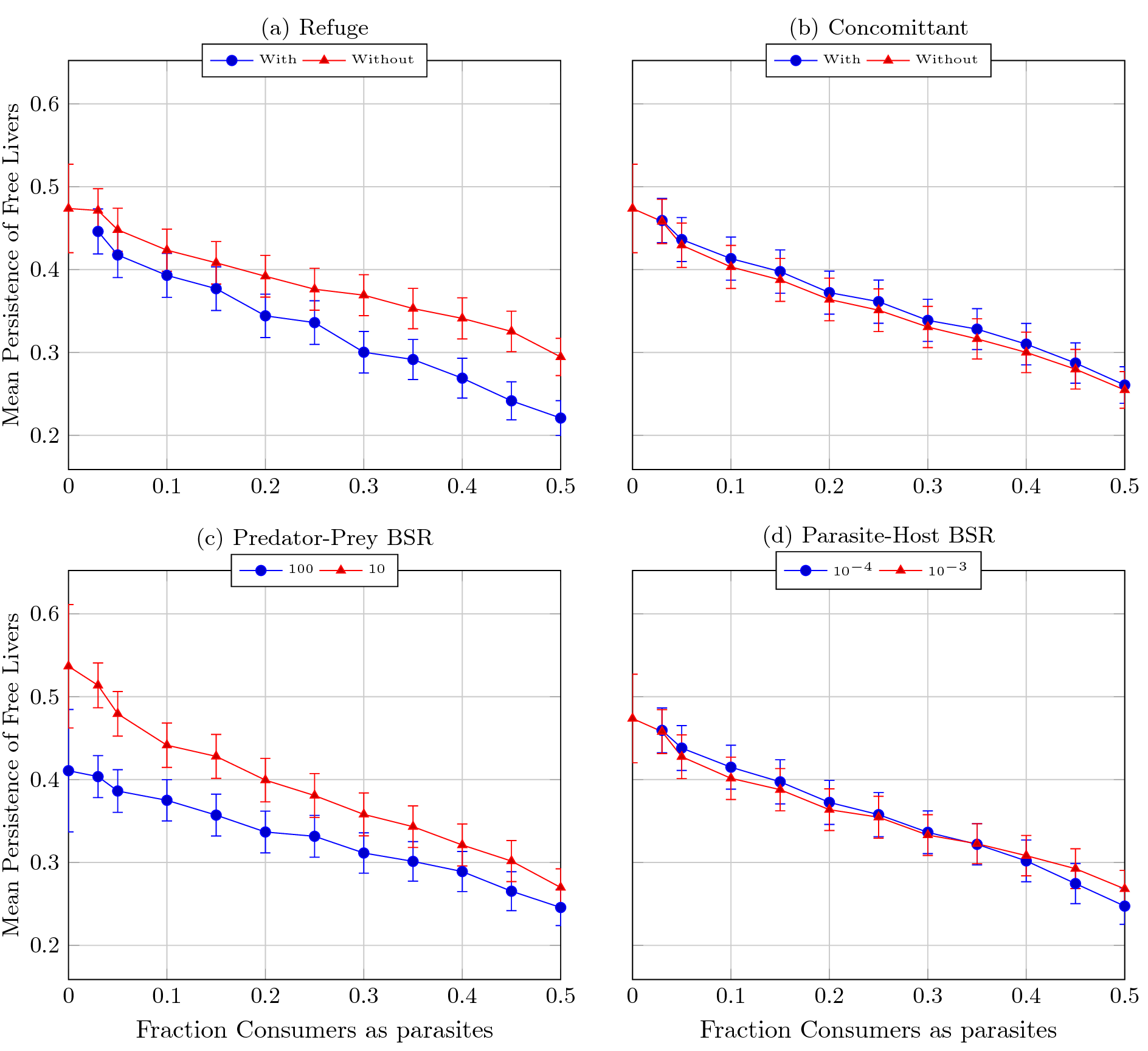
This figure shows the main effect of each factor on the persistence of parasites. Dots represent the average change in persistence over all webs after making the specified change (), error bars represent Bonferroni-corrected 95% confidence intervals ().[fig:perParaDiff]



This figure shows the main effect of each factor on the persistence of free livers. Dots represent the average change in persistence over all webs after making the specified change (), error bars represent Bonferroni-corrected 95% confidence intervals ().[fig:perFreeDiff]

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This figure shows the persistence of free livers at each level of each factor, averaged over each other factor (). Each dot represents the average persistence over all webs and all other factors. Error bars represent Bonferroni corrected 95% confidence intervals (). [fig:perFreeSplit]

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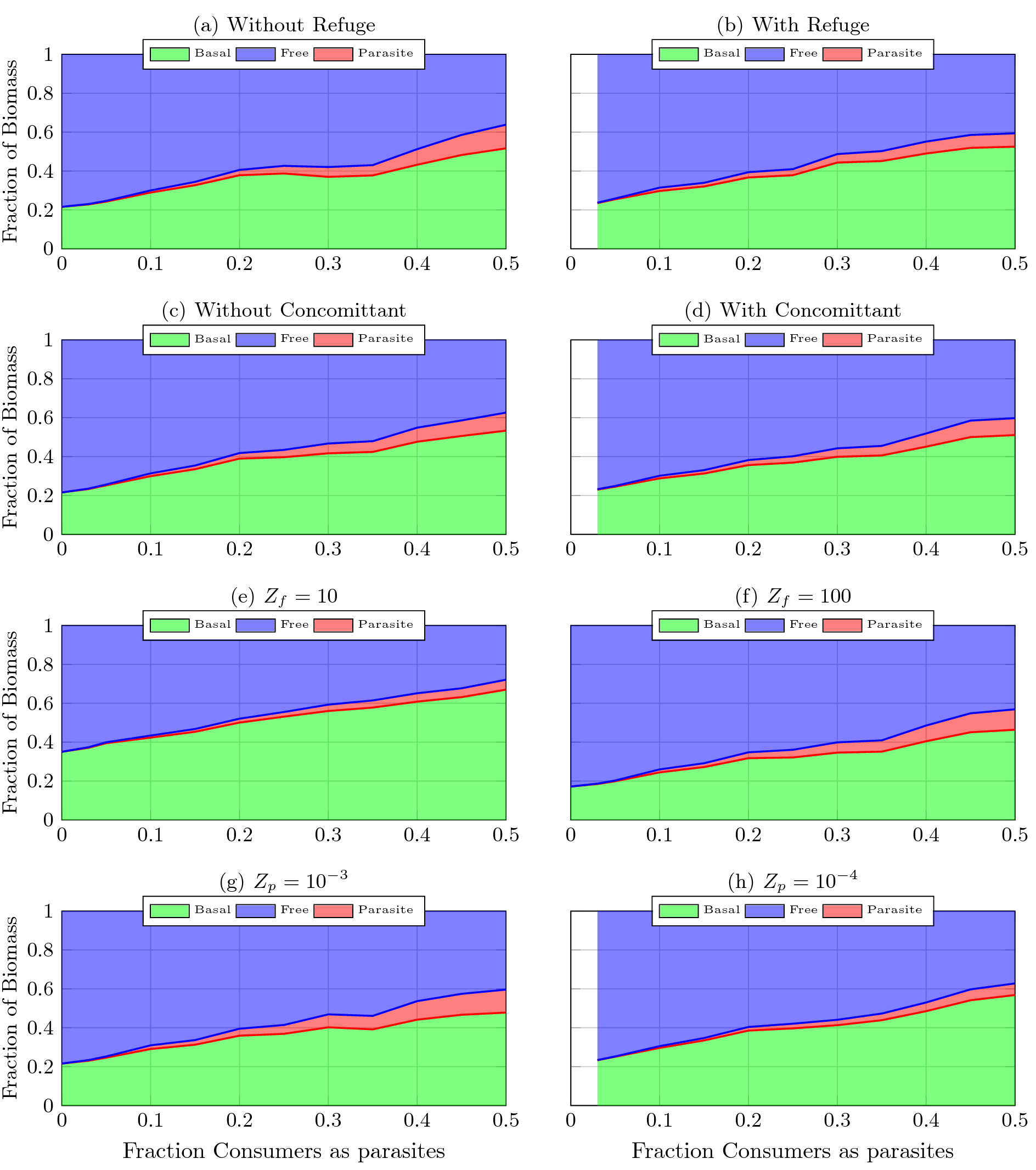
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This figure shows the average relative distribution of biomass for each level of each factor.[fig:fracBioSplit]

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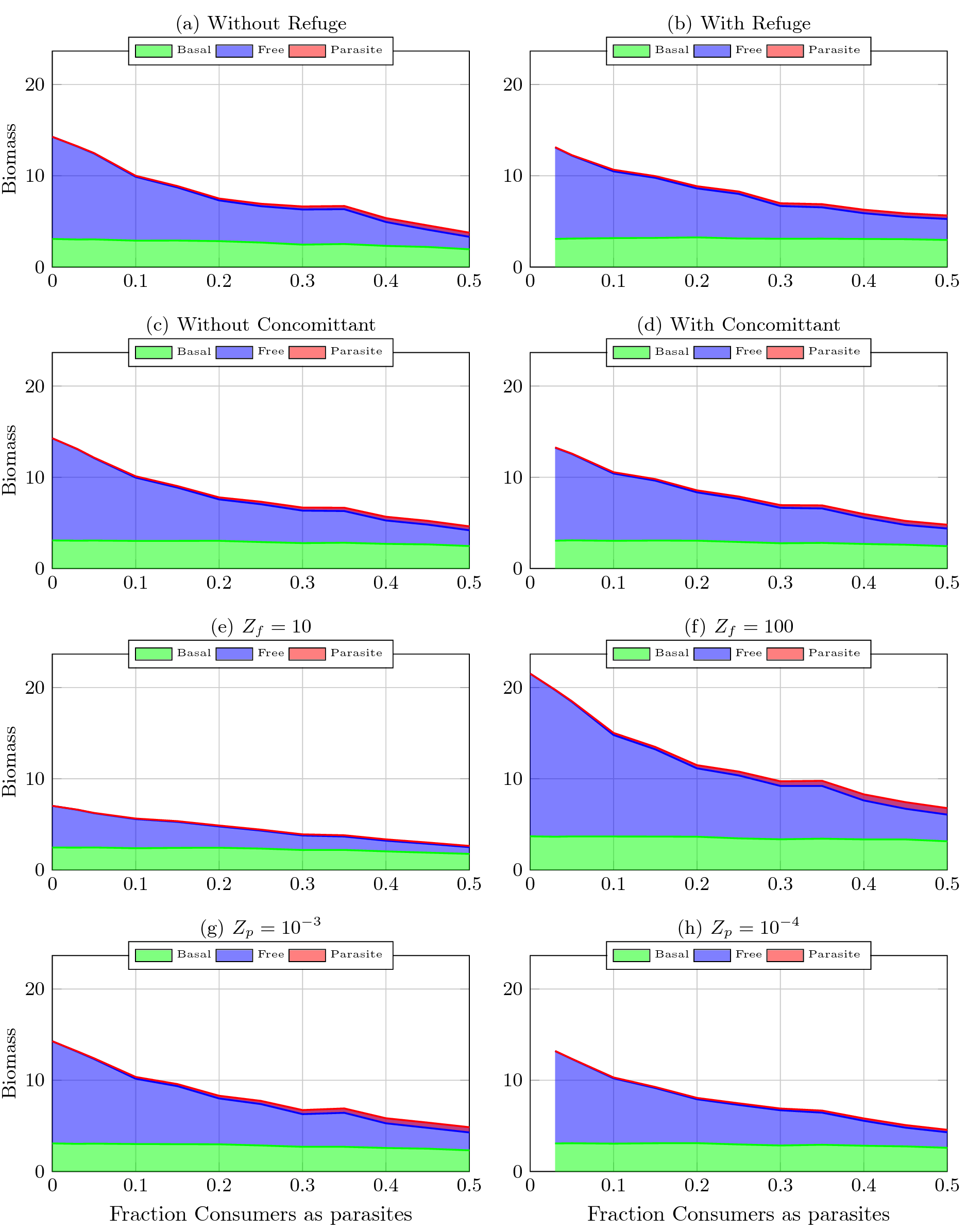
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This figure shows the average distribution of biomass for each level of each factor.[fig:totalBioSplit]

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1. This needs to be worked out a bit better and probably needs to be shown with flow plots. [↑](#footnote-ref-23)
2. Concomittant predation may slow down extinction due to parasitism but maybe won’t impact the actual outcome of hosts. Could look into extinction times, but I also think that the identity of species that go extinct might be changing. [↑](#footnote-ref-24)