Poster Spiel:

Intro:

* My project is focused on better understanding the host-parasite dynamics of a multi-host, multi-parasite system, and trying to get a better handle on how abiotic factors affect this system, so as to hopefully inform future management decisions
* So I’ll start by saying that my work is part of a much larger project being headed by the Hakai Institute in British Columbia, and the goal of their project is to examine the threats that juvenile pacific salmon face during the first few months of their life, and try to understand better how those threats and pressures are potentially impacting their overall population dynamics and contributing to their long term population declines
* So in this system, we’re focused on pink, chum, and sockeye salmon, and what my project has been looking at is the dynamics between these species and two ectoparastic sea lice (Lepthioptherus salmonis a salmon specialist and Caligus clemensi a salmon generalist) that parasitize them
* These sea lice are native to coastal region of British Columbia, but ever since the introduction of intensive aquaculture in the region, domestic Atlantic Salmon have been acting as a reservoir for these parasites, and as the juvenile salmon migrate along the coast of BC from their natal freshwater habitats in the south, between Vancouver Island and the mainland out through Johnstone Strait and into Queen Charlotte Sound in the north, they become infected with these sea lice that are present at really high abundances on the fish in the salmon farms that they pass along the way
* And so while we know a bit about this system, we still don’t have a great grasp on what role these infections are playing for the overall abundance of these salmon. And so we want to know more about the infection dynamics playing out here
* And so there are two main questions we wanted to ask of these data: 1) is are these two species of sea lice infecting the three species of salmon differentially, and 2) is do they show differing levels of infections in different regions

Methods:

* So to do this, an extensive field sampling program was put in place, and juvenile pink, chum and sockeye salmon were sampled weekly between the months of May to July from 2015 – 2018 in two regions, the Discovery Islands and Johnstone Strait
* Nets were used to catch these fish samples, and along with a ton of other information, data on lice abundance on each fish was taken
* We then used a series of GLMMs or mixed-effect models, to look at species-level differences as well as region-level differences in our data

Results

* And so we found that these lice are present at much different levels throughout the system, with the generalist species being far more abundant across all of our samples than the specialist
* And they actually show differing infection pressures as well. Our models showed us that the generalist C. clemensi was present at much higher estimated average levels on every single species of salmon in every single year than the specialist L. salmonis
* Sockeye and Pink salmon had much higher estimated averages than Chum salmon for the generalist louse, and Pink salmon again had the highest estimated averages for the specialist louse as well
* In addition, we saw much higher infection levels generally for the year 2015 than any of the other years, which confirms previous findings that lice infections vary pretty heavily from year to year
* In our region level results, we also saw interesting results, with higher estimated average lice loads in the Johnstone Strait region, for all year and salmon species combinations. This indicates that these fish are much more likely to be infected with lice after they’ve passed through the region with intense aquaculture
* For L. salmonis, however, the results are the opposite, showing higher per-fish average lice estimates in the Discovery Islands, as opposed to Johnstone Strait, except for in Sockeye Salmon, which show higher averages in the Johnstone Strait Region
* To check these region-level models, we performed hierarchical bootrapping on our data, and it confirmed, with only one exception, that the model estimates were well within the data-driven 95% confidence intervals

Conclusions:

* And so what can we take away from this? Well, it was really clear from our analysis that there are much higher infection pressures from sea lice on certain salmon species, which is important because that could potentially result in certain species experiencing more mortality or reductions in fitness than other salmon species simply due to lice infections
* Additionally, the fact that C. clemensi were shown to be much more abundant on the fish in Johnstone Strait than in the Discovery Islands indicates that aquaculture is probably playing a role in terms of where along their migration route these fish are most exposed to infection by these sea lice