Introduction::::::

host that may or may not be pathogenic

**Discussion::::**

* Talk about C. clemensi and about the differences in the species level results for salmon, talk about what this means in terms of the relative importance of sources and what it indicates about the host-parasite dynamics
* *C. clemensi* is likely higher for a number of reasons
  + In the absence of very high very high infestations of *L. salmonis* in salmon farms, there are comparatively few alternate hosts for this specialist species other than juvenile salmon. This is likely to result in moderate to low levels of *L. salmonis* in the absence of high densities on farms, as the generalist louse should maintain a relatively constant level of infection through years (albeit with some fluctuation) compared to the specialist. We do in fact see less variation in the yearly and species level differences in *C. clemensi* (Figs. 4 & 6), compared to *L. salmonis* (Figs. 5 & 6).
  + Pacific herring, who often carry very high abundances of *C. clemensi*, could play a larger role than previously thought in determining the lice load of this generalist louse species.
  + The fact that infection levels by *C. clemensi* are so much higher than *L. salmonis* indicates a few things. First, if herring are a primary source of infection to these juvenile salmon, this indicates that baseline infection levels of *C. clemensi* on these juveniles are potentially higher than previously thought. If this is true, when taken with previous work by Krkosek et al. (2005) that shows only a few lice per fish can cause serious consequences, it could be that, particularly for pink and sockeye salmon who face high infection pressures from *C. clemensi* according to our analysis, even relatively small increases in *L. salmonis* transmission from farmed fish could cause population level effects by pushing the number of lice per fish past a ‘threshold’ beyond which the infections lead to severe loss of fitness and increased mortality
* It’s important to note that this is a major out-migration by multiple species in the same location at the same time, so these species-level results are revealing that these lice are showing a host preference or specificity, or perhaps the three hosts in our data differ in terms of their susceptibility in some way
  + Particularly with respect to the huge differences in infection levels between pink and chum salmon, who both enter marine environments at similarly early development (Groot & Margolis 1991). However, although fork length did not improve the fit of any of our models, it is possible that the smaller size of pink salmon relative to chum salmon upon entering marine environments could play a role in determining their susceptibility to lice infections.
* There’s also clearly a temporal aspect to these results, indicating that various important factors could be affecting lice abundance in a given year
  + Treatment of fish in salmon farms
  + Environmental conditions
* There seems to be a coupling between the ratio of lice abundance between years – this could indicate that whatever conditions result in high levels of infection on juvenile salmon affect both species of lice relatively equally such that high infection years are combined in a way and thus present an even greater challenge to the salmon
* Perhaps the most noticeable species-level result is that pink salmon take the brunt of infection from both *C. clemensi* and *L. salmonis,* and contrary to that, infection of chum salmon is nearly non-existent in *L. salmonis* and still relatively low in *C. clemensi*.
* Region-level results that show almost identical ratios between the regions throughout the years indicates some sort of constant pattern in terms of what’s determining the infection levels in those regions relative to each other
  + This could suggest some sort of autocorrelation (potentially deterministically driven) that relates lice abundances in both regions to each other. That is, it doesn’t appear as though lice abundances in the two regions fluctuate independently of each other
  + This is significant as it means that in years of high lice abundance such as 2015 (Fig. 5) the juvenile salmon face high infection pressures along their entire migration route, not only in a single region, and thus when infection pressures are high, they are high throughout the entire migration route
* The fact that Johnstone Strait numbers are higher for *C. clemensi* indicates that perhaps pacific herring are a greater source of sea lice infections to juvenile salmon than previously thought. If salmon farms were indeed responsible for most of the *C. clemensi* infection to juvenile wild salmon, we would expect to see higher infection rates in the Discovery Islands, closer in proximity to salmon farms, then lower lice abundances in the north, with many of the highly infected individuals having died before reaching Johnstone Strait.