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Tool for predicting *Caligus rogercresseyi* abundance on salt water salmon farms in Chile

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Abstract

Caligus rogercresseyi is a host-dependent parasite that affects rainbow trout and Atlantic salmon in Chile. Numbers of sea lice on fish increase over time at relatively predictable rates when the environment is conducive to the parasite's survival and fish are not undergoing treatment. We developed a tool for the salmon industry in Chile that predicts the abundance of adult sea lice over time on farms that are relatively isolated.

We used data on sea louse abundance collected through the SalmonChile INTESAL sea lice monitoring program to create series of weekly lice counts between lice treatment events on isolated farms. We defined isolated farms as those with no known neighbors within a 10 km seaway distance and no more than two neighbors within a 20 km seaway distance. We defined the time between sea lice treatments as starting the week immediately post treatment and ending the week before a subsequent treatment. Our final dataset of isolated farms consisted of 65 series from 32 farms, between 2009 and 2015.

Given an observed abundance at time *t=0*, we built a model that predicted 8 consecutive weekly sea louse abundance levels, based on the preceding week's lice prediction. We calibrated the parameters in our model on a randomly selected subset of training data, choosing the parameter combinations that minimized the absolute difference between the predicted and observed sea louse abundance values.

We validated the parameters on the remaining, unseen, subset of data. We encoded our model and made it available as a Web-accessible applet for producers.

We determined a threshold, based on the upper 97.5% predictive interval, as a guideline for producers using the tool. We hypothesize that if farms exceed this threshold, especially if the sea lice levels are above this threshold 2 and 4 weeks into the model predictions, the sea louse population on the farm is