Lice life-cycle

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| Value | Description | Value | Origin/Reasoning |
|  | Infection rate | eta\_aldrin = -2.576 + log(nfish) + 0.082\*(log(wt)-0.55)  Einf = (exp(eta\_aldrin)/(1+exp(eta\_aldrin)))\*tau\*cop\_cage | Aldrin et al 2017 |
|  | Lice development rate – age and temperature dep. |  | Aldrin et al 2017  Average days:  #5deg: 5.2,-,67.5,2  #10deg: 3.9,-,24,5.3  #15deg: 3.3,-,13.1,9.4 |
|  | Temp | Linear rel. with Northings based on monthly ave from Tarbert and Ardrishaig | www.seatemperature.org |
|  | Mortality rates | [0.17, 0.22, 0.008, 0.05, 0.02, 0.06] | Stien et al 2005 |
|  | Eggs per day | int(round(eggs\*tau/d\_hatching(temp\_now)))  Eggs = 1200 | Costello et al 2006 ~500 eggs per brood, Gravil 3 broods ~ 0.83 viability |
|  | Days hatching | 3\*(3.3 - 0.93\*np.log(c\_temp/3) -0.16\*np.log(c\_temp/3)\*\*2) | Curve through data from Brooker et al 2018 |
|  | Days unavailable for mating post-mating | Female = days hatching  Male = 4 | [ref] |
|  | Male/Female | 0.5 |  |
|  | Probability of female i being picked for mating | , n females in cage | Preference for younger females [ref] |
| x | External pressure | 1/(nfarms+1) for each farm then assigned to cages randomly | Equal probability for all farms (weigh by nymber of cages?) |

Fish growth/death

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| Value | Description | Value | Origin/Reasoning |
|  | Fish per cage | 40000 | See below |
| c | Num. stocked cages | [6,4,8,12,9,9,8,9,9] | Available cages:  [14,10,14,12,10,10,14,9,9] |
|  | Num. cages stocked p. week | [1, 1, 2, 3, 1, 1, 2, 1, 1] | Matched Monthly biomass values for each farm for the first two months if we assume that the values provided are the average for that month and the average weight of salmon that’s been stocked in a month is 100g |
|  | Background mortality | 0.00057  Lice on dead fish are assumed to leave with fish | Smolt survival of 75% after 500 days in line with:  [www.gov.scot/Resource/0052/00524803.pdf](http://www.gov.scot/Resource/0052/00524803.pdf) |
|  | Lice induced mortality | 1/(1+exp(-19\*(adult lice per gram -0.63))) | [ref] 0.75 lice p g of fish threshold |
|  | Weight | 10000/(1+exp(-0.01\*(t-475))) | Logistic curve that matched monthly biomass data |

Resistance

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| Name | Description | Value | Origin/Reasoning |
| **ax** | Underlying resistance BVs in external pop. |  | See phenotype |
|  | Mean underlying resistance BV in farm/reservoir | Estimated in simulation |  |
|  | S.D. of underlying resistance BV in farm/reservoir | Estimated in simulation |  |
| **p** | Proportion of lice coming into reservoir from other area | 0.33 |  |
| **o** | Copepodids arriving from farms within the FMA |  | Adams |
|  | Probability of copepodids from farms to join reservoir | 0.9-sum(**o**) |  |
|  | Probability of copepodids from reservoir to reach a farm | x |  |
| **a** | Underlying resistance BVs of offspring |  | Standard practice e.g. Falconer & Mackay |
| m | Mendelian sampling term | ~N(0,0.5) | Standard practice e.g. Falconer & Mackay |
|  | Generation | Start of each month | Ave. dev. Time to adult at 10 degrees rounded up = 35 |
| **e** | Underlying environmental dev. Resistance | ~N(0,1) | Initially h2 =0.25/1.25= 0.2 now 0.49/1.49=0.33 (heritability of other arthropods to EMB: C. carnea 0.34, M. domestica 0.075, S. littoralis 0.21) |
| **r** | Phenotype | 1/(1 + exp(-(**a**+**e**))) | Highly skewed, mean = 0.945 |
|  | EMB base mortality | 0.9 | Stone et al 1999 |
|  | E(EMB induced mortality) | 0.9\*(1-**r**) |  |