Things within the model to remember:

Ne =/= Nc   
 total migrants =/= effective migrants  
 fitness (chance of dying) is dependent on heterozygosity – only happens @ maturity  
 mate choice is random  
 number of babies generated == number that reach maturity IF maturity = 1 year THEREFORE,

LRS is dependent on the number of babies that reach maturity.

Mutation occurs only once, when generating genotypes, not throughout lifetime  
 migrants chosen at random, not those with high fitness

Variables output in the model (per year):

Nc, number of adults  
 proportion of population that are migrants, number of migrants  
 He, Ho  
 Fis, Fst (compared to original pop at year=0 and compared to source pop)

Number of offspring generated that year  
mean LRS (&SD), LRS for males, LRS for females  
mean RRS (&SD) - defined as *ratio* of repro succ of the indv/max repro succ

Trends to look at and Expectations

Questions I can ask currently, mostly trends we already expect:

Is inbreeding coefficient related to fitness?

Expect yes - inversely, because fitness is due to heterozygosity, which is decreased with inbreeding

**What we expect SHOULD be true, and if it isn’t, that will be a problem because we set that in the model**

**MAKE SURE THIS IS WORKING AND THE TREND IS AS EXPECTED!! Just looking at figs should be alright!**  
 Is LRS related to heterozygosity?

Expect yes - positively, because increased Ho means higher chance to live and reproduce

**Should be, even if binary. Might be a linear relationship, but if the above and below questions are linear, you’d expect this one to be as well. THIS ONE ISNT AS IMPORTANT TO LOOK AT**  
 What is the relationship between longevity and heterozygosity?

Expect positively, see above

**MAKE SURE THIS IS HAPPENING!!! JUST LOOK AT IT**

bottleneck parameters: drop length, duration at small pop size

Larger drop and longer duration will decrease genetic diversity and LRS and increase inbreeding

**>> is this done by the eco-evo vortex paper?? probably has been done before**

**>>>probs hasnt been done with epi stuff, but has with genetic stuff**

**COME BACK TO THIS ONE...**

how does drift act on SNP types (random, fixed in both pops, fixed in one pop) differently?

Order of drift affecting the pop (fastest/largest effect to slowest/small effect): random > fixed one pop > fixed both pops

**>>>migrant contributions for source fixed snp**

**TURN THEM BACK ON AND RUN WITH THEM -- OTHER QUESTIONS SEEM MORE INTERESTING**

does mutation rate effect chance of extinction/rate of drift?

ideally, it shouldn’t matter since mutation is such a small force – go for flat!

**KIND OF INTERESTING -- IF TRUE, THAT IS IMPORTANT, BUT WOULD NEED TO CRANK MUTATION UP UNREASONABLY HIGH**

**--- SECOND PAPER-- FIND WHERE MUTATION RATE WPOULD BE TO INFECT A CHANGE (UNREASONABLY IGH) THEN**

**-- EPI LOWERS THE EFFECT OF STRONG BOTTLENECKS (SINCE INDV ARE ADAPTED TO THE LOCAL ENVIRONMENT), WHICH REDUCES THE EFFECTIVNESS OF BOTTLENECKS AND HIGH MUTATION**

**IF NOT COMPENSATING WITH MUTATION ONLY, THE PARAMETER OF MUATTION IS LESS IMPORTATNT BECAUSE EPI IS ALSO ACTING ON IT TO HELP IT SURVIVE AND REPRODUCE**

**REALTIONSHIP OF MUTATION AND EPIGENOME**

**IN MY MODEL, I HAVE CONSTRAINED HETERO AS POSITTIVE TO FITNESS, SO THEREFORE MUTATIONS WILL INCREASE FITENSS!!! MUTATIONS ARE ONLY BENEFITICL (BY ADDING GENETIC VARIATION) IN THIS MODEL BECAUSE THERE ARE NO LETHAL MUTATIONS!!!!**

How effective are migrants and how do the migrant and population genotypes change over time

More migrants, more genetic variation introduced into the population, with a higher effect on small pops

**IF turn off migration, for how long can you detect their ancestry??**

**or pulse of 50 indv over 3 years (pulse translocations) and bumps fitness, is that a sustained benefit?**

**>> can do this without doing epi**

**>>>must check to see that this hasnt been done. like no metanalysis or existing model**

**^^ if i dont get the trends expected for the things above, then the model might not be reasonable for those questions**

**\*\*remember that the benefit is a model is that longterm effects, so need something to look forward on! makes it relevant and important!**

**SO WILL DO THE EPI AND THE MUTATION QUESTIONS, AS TWO SEPERATE PAPERS! WILL NEED A TRIVIAL QUESTION FOR EACH TO SHOW THAT IT WORKS**

**Part 3: DRIFT-MUTATION-EPIGENOME EQUILIBRIUM \*\*\*\***

Questions I can ask by changing/adding to the model a bit:

**how well does the model work with species with varying life history traits?**

Ideally, \*should work for all\* but species with longer lifespans are at more risk of extirpation

**How does a migrant with high vs low fitness affect the receiving population’s stability?**

Migrant with high fitness will be more represented in the new pop, especially in small pops

I really like this question. There are two opposing thoughts: those with low fitness in original environment move because they cant survive where they are (evolution-based), or those with high fitness/boldness move, potentially because they can survive in more variable environments (behavior-based)

**DOES EFFECTIVE MIGRATION FOR TRANSLOCATIONS LAST—IS IT A TEMP BOOST OR NOT!!!**

**^^ SUB B:: ARE OFFSPRING OF MIGRANTS GOING TO BE HIGHLY HETERO? – COULD BE A YES, SINCE MENDELIAN GENETICS BUT CAN ALSO NEED TO BE ARTIFICALLY AFFECTED**

**^MAY NEED TO SWITCH TO 1-4 SNPS INSTEAD OF 0-1 BECAUSE THIS IS ONLY ALLOWING 2 ALLELES AND THE SOURCE AND RECEIVING POPS MAY HAVE SIMILAR OR DIFFERENT ALLELES DEPENDING ON HOW CLOSE PHYSICALLY AND GENETICALLY THEY ARE, AND THAT MATTERS**

**FOR IF POPS ARE HIGHLY DIVERGED AND FAR OR CLOSE AND SIMILAR.**

CHOOSING SPECIES - TRY TO PAIR - HIGH/LOW FECUNDITY , LOW/HIGH LIFESPAN ~~ JANNA NEVER FOUND ANYTHING SUPER INTERESTING

OVERALL QUESTIONS

From Evolution 2022:   
*How does migration effect long term population persistence when extirpation risk is high?*

*How does migration rate alter long term population persistence when migration is initiated at various population sizes and trajectories?*

*Under what conditions does constant migration prevent population crashes, despite reduced K?*

Additional questions to consider:  
  
*Can we predict the number of migrants from Fst values? – this would relate to Fst vs coalescent data!! (Not exactly sure how to do this other than test regressions but would be cool if we could do some calculations and figure this out!)*

*Epi – how is the epigenome influenced by the environment?*

**Overall Conservation Application Question:  
*Do migration patterns predict population crashes better than other criteria used to rank conservation need?***

**\*These aims will support future considerations of promoting migration (via corridors or translocations) when managing species on the brink of extinction.\***

Trends in Science to remember

Small pops are of highest population concern; decreased genetic diversity, increased inbreeding, increased genetic drift. Therefore, increased recessive traits, increased genetic load of unfavorable genes.

Benefits of migration vary with K of source and pop, rate and frequency of migration, pop growth rate

Forces of Evolution: mutation, migration, selection, and drift