Overall:

- No longer any complete plants listed as “error” when R-script is run

- I’ve now combined all other error issues into this file, a file with a summary of negative investment problems (very few), and a file “Error summary” which shows all my various cross checks, indicating which ones don’t work. I’ve tried to describe actual issues below.

- Remaining negative investment issues pasted into a single file. I’ve made notes as to what to do with each incidence. Some I am simply accepting, because there is no obvious fix. There are a few I am puzzled by, because with dynamic parts splitting they shouldn’t exist. And I can’t figure out the BAER problems – see below.

Fixed in many cases.

- Lots of small problems with the implementation of “survival of the fittest”, mostly across stages where a large number of parts are shed – for instance between finished\_flower\_stigma and fruit\_just\_starting. Then for parts that legitimately jump from the bud stage straight to a young fruit stage, the fruiting part is assumed to be a derivation of a previously appeared flower/finished flower stigma, and the count of petals does not match up with “sum of fruiting parts”. For GRSP and GRBU I’ve solved most (all?) of them, by sometimes shifting the census where a part appears by 1. For HEPU I have not at this point, because I’d be changing the progressions of items too much. See below under “HEPU” for more.

Wondering if a solution to this problem could be to create a look-up table, indicating how many progression steps a given species\*part combination can “exist” before being counted as lost. Then parts that always progress could be coded as “1”, while others (like the BAER cones creating problems) can be coded as “8”.

EHW 03.12.14: New for Konrad to fix: Remove “flower\_calyx” from PEPU map – flowers don’t have one, which I suspected for some time, but just was able to verify. Remaining cones and buds I need now in drying oven and in a few weeks will add remaining fruit parts. Cicadas very loud this morning – and I saw my first echidna at my field sites – photo to come.

ALL CORRECT mid-October 2014: COER, EPMI, GRSP, HATE, LEES, PELA, PILI

EHW 26.11.14: ALL CORRECT 26 Nov 2014: GRBU; all previous still correct – have checked with flowering parts from second year for all species except PUTU; waiting for other fixes to check PUTU

EHW 03.12.14: additional all correct: PHPH, PUTU

EHW 03.12.14 summary, details below:

BAER – 1 map fix, 1 strange investment progression; otherwise all correct

BOLE – something strange going on with progression from petals to late petals and finished flower to late finished flower; otherwise all correct

EPMI – 1 plant now an “error”

HEPU – issue with aborted fruit being duplicated; otherwise all correct

PEPU – waiting on plant parts, but think it all works; one more small map fix

EHW 26.11.14: Did you notice that in the excel file, ALL PLANT PARTS FOR ALL SPECIES NOW SUM CORRECTLY ACROSS THE 4 OUTPUT FILES? And the last few cases where the petals don’t equal fruit parts should be fixed with the last round of tweaking!!

EHW 03.12.14: EPMI 153 has overall error, stared and stared, but see nothing. Can your eyes help?

EHW 04.12.14: BAER plant map change 🡪 cone\_aborted should come off cone\_young, not cone\_green – right now the right cones aren’t being matched up across stages, causing some of the big negative investment problems. And I’ve checked and all cone\_aborted never progress through cone\_green, but instead go straight from cone\_young to aborted

BAER

* cone\_green\_01 not correctly progressing to cone\_brown or cone\_brown\_DEF because 6 censuses between stages (BAER\_005, 803, 806, 902, 905, 907)  
  I would like you to be more specific with the problem. I can’t see with my math eyes what is it that makes the problem. I think it works correct…

EHW 26.11.14: The problem is no longer present, so some other fix, also got this.

* Minor issues with one cone – see error spreadsheet.  
  Possibly a coding issue. Cone aborted is on top of the map and hence will have priority over all others when choosing predecessors. The survival of the fittest do not act in the favour in this case.

EHW 26.11.14: Also fixed now

* A handful of puzzling negative investment problems. In most cases the “To” part has an actual weight, so I assumed the problem was that the previous part had too high of a calculated weight. So I slightly reduced the dimensions of the “From” part to allow there to be a positive progression. But decreasing the dimensions didn’t change the investment numbers at all. (I reran all the bits of code that should recalculate individual weights and weights from dimensions.)  
  I see the problem for 7 investments, and few individuals. I will have a look at that.

EHW 04.12.14:

3 of the problems have to do with cone\_aborted – see above for plant map change.

Two I solved – YEAH! They were in plants where one cone became a “cone\_brown” and one a “cone\_brown\_NEF”. The one headed to “cone\_brown\_NEF” always showed a giant negative investment. I wondered if I needed to list the cones heading there second (instead of first) in the “cone\_green” list and that solved the problems.

Then there are the remaining 2 with bases, not at all clear because in both cases, the bases clearly progress in size and there is only a single number in the box.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| cone\_base\_green\_02 | cone\_base\_green\_03 | -163.7862016 | 1 | -163.7862016 |
| cone\_base\_green\_01 | cone\_base\_green\_02 | -6.857669393 | 1 | -6.857669393 |

BOLE

* Finished\_flower has 2044 too many (see Error\_summary file). Checked repro spreadsheet and #2140 is correct for total number that “pass through”. I’m at a loss to explain this.

Problem is possibly fixed by changes to the definition of Error. See HEPU for more explanation.

* Continued problem with negative investment going from “flower\_calyx” to “finished\_flower” although sums should work: flower\_calyx 🡪 finished\_flower + 4\*finished\_flower\_stigma (5.96 < 4.93 + 4\*.35)  
  Fixed. There was a mistake in the implementation of carbon flow, which could have affected few plants were the multiplicity changed at split points. Should be correct now and many negative investments should disappear.
* We need to add another bit to the plant map: Late\_flower\_petals ; I just finally weighed “late\_finished\_flower” separated from the petals (enormously decreasing its weight), but in the process determined that the flower petals increase in weight by ~30% in the flowers that have growing fruits in them. It would be a progression from “flower\_petals”  
  Could you please make first change in all the spreadsheets before we follow with the changes in the code.

EHW 26.11.14: DONE. All changes also made to various look-up tables.

Fixed. Late flower petals needs to be added to repro spreadsheet too.

* NEW ISSUE NOTED: There is a problem with the flow of parts leaving “finished\_flower”. There are no parts going from finished\_flower to “late\_finished\_flower”, although there should be.  
  I don’t understand that. I see that in my calculations. Consider rerunning. \

EHW 03.12.14: I think I mischaracterized the problem last week – although it is still there. The number of fin dev parts for “finished\_flower” is larger than the number of parts going “to” minus the number going “from”. Both the to and from are correct – I checked that manually. Wondering if some numbers being multiplied by 4 that shouldn’t be (or vice versa). The same is true for flower petals/late\_flower\_petals now that the new part is included. So this error has something to do with development along the side branches, where somehow the fin dev numbers are much too high for the intermediate stage. Hope that helps. I’ve pasted numbers for all the individuals into the file titled “BOLE trouble”. Playing with the numbers, there is no single correction that works for all – but of course there could be other errors that I can’t track yet – but for most it appears that the “fin dev” value for petals, assumes that all investment to petals has been added twice and then the investment from petals to late\_petals has been subtracted off just once. But this is only true for plants where there were late\_petals – if there were no late petals, then the “fin dev” value to petals is correct. And similarly, if I deleted the “late\_petals” column from the repro file it runs correctly. Hope this provides some help for you. I’m guessing something similar is going on with the finished flower to late finished flower progression

* Otherwise ALL CORRECT

GRBU

* Finished\_flower\_stigma has negative “lost” counts in many cases, causing me to stop looking in more detail. I am wondering if something has been mistyped in the plant map that skips some part of the pathway leading to or from “finished\_flower\_stigma”. I think part of this problem may be because until yesterday (Oct 22) afternoon, there were no weights for “finished\_flower\_stigma”, but these have now been added and the problems haven’t disappeared.  
  Fixed. Missing information in the “OrderedListOfParts.R” file has been now added.
* Infl\_bud\_small weighs more than infl\_stalk (Lizzy to fix; to begin with I’ll collect some new stalks and see if I collected different bits for just the stalk versus when I call it a “bud”)

EHW 26.11.14: FIXED.

26 Nov 2014 – all correct

HEPU

* With HEPU there are many individuals where Fin\_Dev calyx\_fruit does not add up to the sum of Fin\_Dev for (fruit\_young + fruit\_large\_immature + fruit\_mature). In most of these cases it is a “survival of the fittest” problem, where some of the previous censuses fruit\_young + fruit\_large\_immature have shed, and there are new fruit\_young + fruit\_large\_immature (+ calyx\_fruit) that have developed. However the exact development pattern means that the program assumes it is the previous ones developing further. The problem is that it knows the calyx\_fruit are new, so the number of calyx\_fruit exceeds the number of fruit\_young + fruit\_large\_immature, the latter of which are incorrect. I think a possible fix would be to use fruit\_young02, fruit\_large\_immature02, fruit\_large\_immature03 to clarify progression. Is this a big mess for you to implement on the plant map? If you can make the changes, I’d like to figure out exactly what added categories are needed first and then have you change things.  
  Lizzy prepare the list of necessary changes and I implement them later on.

EHW 26.11.14: Here are the changes:

I’ve added two categories to the reproduction spreadsheet: “fruit\_young\_aborting” which will be an alternative deadend to “fruit\_young” and “fruit\_large\_immature\_aborting” which will be an alternative deadend to “fruit\_large\_immature”. Basically, I have gone through all the individuals and manually decided which parts are aborting/not developing versus which are, working backwards from the number of mature fruit. This ensures that a part that is shed never is falsely assumed to progress. In the flowering parts spreadsheet, I have simply duplicated the entries for “fruit\_young” and “fruit\_large\_immature” and given the duplicate set new names so that the weights will be the same for both categories. I’ve also added the new categories to all the various lookup tables.

EHW 27.11.14: More changes:

Have also added categories “flower\_calyx\_aborting” and “finished flower\_aborting”. As with categories described in the previous paragraph, these parts have the same weights as the “normal” versions of the categories, but some parts are called “aborting” because I know they don’t progress. After implementing the changes to all the fruits, it solved the “survival of the fittest” problems there, but still problems with flowers. I think it will all work now – I’ve manually added up counts in different columns. I’ve also added the new categories to all the various lookup tables.  
Implemented the changes. Lizzy needs to check if they give the expected results. Updated plant map uploaded on git to check if this are the changes expected.

* + Another odd thing, in HEPU, the count of “fruit\_aborted” is always 12, but there are only 6 of them. And nothing in the multiplier table should cause this count to be doubles. Each individual.  
    To be re-run and verified again. I see no problem.

EHW 03.12.14: This problem still exists. In multiplier table always “1” for HEPU. Is it possible that there are two links to “fruit\_aborted” in the plant map? Maybe the term appears twice in some list, because we moved where it should fit into the plant map and it was never deleted from the previous location? Oddest of all,

* There is also a problem, shown on the excel error summary, that for HEPU\_001, HEPU\_002, HEPU\_003 and HEPU\_004, a number of the bits that are on the plant at the beginning of the experiment are not correctly being acknowledged as “errors”. I assume this means these individuals have too high a total investment number.

- They were not being counted as errors deliberately. No backwards investment calculations was done at census 1 and hence no detection of such behaviour was made.

- I have now modified the code and that kind of “error” is also stored and indicated in the results.   
- The old action of the script could have affected the some of your calculations in Error\_summary.xlsx. I suggest those should be redone.

EHW 26.11.14: Will wait and check this together with rest of HEPU once new categories added

PEPU

* Remove “bud\_aborted” from plant map; never used  
  Fixed
* Can’t check for negative investment problems until after I collect remaining parts
* But all parts sum up correctly

PHPH

* The number of flower petals does not equal the sum of (flower\_stigma + finished\_flower\_stigma + fruit\_just\_starting + fruit\_young + fruit\_large\_immature + fruit\_aborted + seed\_pod). It does equal if seed + seed\_aborted is substituted for seed pod. I think this is because the plant map is following backwards from the seed/aborted seed, rather than the seed pod. Since seed pods have variable seed number (0,1,2), but map assumes there are always 2, it makes the assumption that there are some fruit\_young and fruit\_large\_immature that have been "lost" when in reality they have turned into empty seed pods. However, if you consider "seed pod" the end of the developmental trajectory, then the numbers should add up. I'm guessing this is a change to the plant map.  
  To be continued. Spontaneously, I believe it should be plausible to code the seed pod as the final thing and the seeds as accessories.   
  The change is made. To be verified if it solves the problem.

EHW 03.12.14: ALL CORRECT NOW!

* Otherwise ALL CORRECT

PUTU

* Quite a few “seed pods” are very lightweight, creating lots of negative investment issues. I’m tempted to leave this. Same issue for “fruit\_aborted”.

Should be fixed now with updated weights definitions.

* Also quite a few negative investment issues with the lightest weight “bract\_flower\_or\_finished\_flower” and “flower\_calyx”, but these values are all high enough that they shouldn’t result in negative investment from the “big\_bud” stage. There is also an instance of this for PHPH. The individual based mechanism for dividing investment is now included, right?  
  There is no individual based mechanism. The mechanism is species specific. Try to check the multiplier table and see if everything is specified correctly there.
* Still an error with too many “Finished\_flower\_stigma” ended up as a “Fin\_Dev” part. I’ve gone through many of the individuals and can’t find any mistakes in the repro spreadsheet but also can’t find any pattern that would explain the error. This may be the same sort of error as arises with PHPH. With both species, “seed pod” is the numerically accurate final development of the stigma 🡪 fruit progression, not “seed”  
  To be continued. Spontaneously, I believe it should be plausible to code the seed pod as the final thing and the seeds as accessories.   
  Change done, to be verified if it results in the required.

Mistakes are in:

(parts are 2x numbers in repro spreadsheet)

|  |  |  |  |
| --- | --- | --- | --- |
| Individual | petals | derived parts | diff |
| PUTU\_004 | 186 | 236 | -50 |
| PUTU\_005 | 136 | 168 | -32 |
| PUTU\_805 | 238 | 264 | -26 |
| PUTU\_003 | 106 | 116 | -10 |
| PUTU\_908 | 40 | 46 | -6 |
| PUTU\_902 | 296 | 300 | -4 |
| PUTU\_903 | 166 | 170 | -4 |
| PUTU\_403 | 94 | 96 | -2 |
| PUTU\_405 | 186 | 188 | -2 |
| PUTU\_804 | 30 | 32 | -2 |
| PUTU\_906 | 86 | 88 | -2 |

To do priorities:

1. Small error fixes done
2. The 3-year olds
3. The higher resolutions.