```
diff --git a/DESCRIPTION b/DESCRIPTION
index 5543f72..b74e294 100644
--- a/DESCRIPTION
+++ b/DESCRIPTION
@@ -1,6 +1,6 @@
 Package: FijiNFMSCalculations
 Title: Fiji NFMS Calculations
-Version: 1.0.6
+Version: 1.0.7
 Authors@R:
     person(given = "Michael",
            family = "Green",
diff --git a/NAMESPACE b/NAMESPACE
index bdbb881..79ee423 100644
--- a/NAMESPACE
+++ b/NAMESPACE
@@ -91,6 +91,8 @@ export(calcEmissionFactors)
 export(calcFRLAdjustedAreas)
 export(calcFRLAfforestation)
 export(calcFRLBurning)
+export(calcFRLBurningAlg)
+export(calcFRLBurningRun)
 export(calcFRLContributions)
 export(calcFRLDeforestation)
 export(calcFRLDegradation)
diff --git a/R/Burning.R b/R/Burning.R
index 3f90fa3..c4c430c 100644
--- a/R/Burning.R
+++ b/R/Burning.R
@@ -19,20 +19,25 @@
 CalcEstEmFire <- function(Age,
                           MAIBsw, # Mean Annual Increment Biomass softwood
                           RootToShootDryLandSmall,
-                          Area) {
+                          Area,
+                          local_CombustFactor = CombustFactor,
+                          local_GWP_CO2 = GWPCO2, local_EF_CO2 = EFCO2,
+                          local_GWP_CH4 = GWPCH4, local_EF_CH4 = EFCH4,
+                          local_GWP_N2O = GWPN2O, local_EF_N2O = EFN2O
+                          ) {
   # Estimate AGB
-  AGB <- Age * (MAIBsw / (1 + RootToShootDryLandSmall))
+  AGB <- Age * (MAIBsw * (1 - RootToShootDryLandSmall))
   # Estimate BGB
   BGB <- Age * (MAIBsw * RootToShootDryLandSmall)
-  # CO2 ABG emissions
-  EmCO2AGB <- Area * AGB * CombustFactor * GWPCO2 * EFCO2  * 0.001
-  # CO2 BGB emissions
-  EmCO2BGB <- Area * BGB * CombustFactor * GWPCO2 * EFCO2 * 0.001
-  # CH4 ABG emissions
-  EmCH4 <- Area * AGB * CombustFactor * GWPCH4 * EFCH4 * 0.001
-  # N_2O (above-ground biomass)
-  EmN2O <- Area * AGB * CombustFactor * GWPN2O  * EFN2O * 0.001
+  # CO2 ABG emissions -> CO2e
+  EmCO2_AG <- Area * AGB * local_CombustFactor * local_GWP_CO2 *
```

```
local_EF_CO2  * 0.001
+  # CO2 BGB emissions -> CO2e
+  EmCO2_BG <- ConvBiomassToCO2e(Area * BGB)
+  # CH4 ABG emissions -> CO2e
+  EmCH4 <- Area * AGB * local_CombustFactor * local_GWP_CH4 * local_EF_CH4 * 0.001
+  # N_2O ABG -> CO2e
+  EmN2O <- Area * AGB * local_CombustFactor * local_GWP_N2O  * local_EF_N2O * 0.001
   # sum emissions for each gas and put into dataframe
-  df <-data.frame(sum(EmCO2AGB), sum(EmCO2BGB), sum(EmCH4), sum(EmN2O))
+  df <-data.frame(sum(EmCO2_AG), sum(EmCO2_BG), sum(EmCH4), sum(EmN2O))
   return(sum(df))
 }
diff --git a/R/CalcFRLBurning.R b/R/CalcFRLBurning.R
index 7b139ea..4ba96a1 100644
--- a/R/CalcFRLBurning.R
+++ b/R/CalcFRLBurning.R
@@ -1,15 +1,45 @@

+
+
 #' @export
-calcFRLBurning <- function() {
+calcFRLBurningAlg <- function(sw_barea,maibp,rdlk1,bioburn_ghgs) {
+  result <- list()
+  result$sw_barea <- sw_barea
+  # Sum of emissions per year
+  result$swfiret$total <- sapply(split(result$sw_barea[,c(1:3)],
+                                       f = result$sw_barea$year),
+    function(x) {
+      return(CalcEstEmFire(x["age_yrs"], maibp, rdlk1,x["area_ha"],
+                           local_CombustFactor = bioburn_ghgs[1,"combustion_factor"],
+                           local_GWP_CO2 = bioburn_ghgs[1,"global_warming_potential"],
+                           local_EF_CO2 = bioburn_ghgs[1,"emission_factor"],
+                           local_GWP_CH4 = bioburn_ghgs[2,"global_warming_potential"],
+                           local_EF_CH4 = bioburn_ghgs[2,"emission_factor"],
+                           local_GWP_N2O = bioburn_ghgs[3,"global_warming_potential"],
+                           local_EF_N2O = bioburn_ghgs[3,"emission_factor"]))
+    }
+  )
+
+
+  # Average annual emissions [tCO2e yr^-1] from biomass burning in Softwood Plantations .
+  result$fd_bb_aae <- mean(result$swfiret$total)
+
+  return(result)
```

```
+}
+
+
+
+#' @export
+calcFRLBurningRun <- function(debug_frl,sw_barea,FRLParams,bioburn_ghgs) {
   # Structure of 'sw_barea'
   if (debug_frl) {
-    print(paste0("==== debug: ", "CalcFRLBurning.R", ":6"))
+    print(paste0("==== debug: ", "CalcFRLBurning.R", ":36"))
     print(str(sw_barea))
   }


   if (debug_frl) {
-    print(paste0("==== debug: ", "CalcFRLBurning.R", ":12"))
+    print(paste0("==== debug: ", "CalcFRLBurning.R", ":42"))
     # Aggregate compartment data for the years 2015 to 2018
.................................
     ## Total area burnt in year t
     sw_barea_agg <- aggregate(area_ha ~ year, sw_barea, sum)
@@ -23,47 +53,26 @@ calcFRLBurning <- function() {
     print(sw_barea_agg)
   }

-  # Above- and below-ground biomass in compartments
-  # 0.2 = Rdll Root-to-shoot ratio tropical moist deciduous forest < 125
tB ha-1
-  sw_barea$agb <- sw_barea$age_yrs * (FRLParams$maibp / (1 +
FRLParams$rdlk1)) # AGB
-  sw_barea$bgb <- sw_barea$age_yrs * (FRLParams$maibp * FRLParams$rdlk1)
# BGB
-
   # Table of greenhouse gases
   names(bioburn_ghgs)[1] <- "GHG"

   # Table of greenhouse gases
   if (debug_frl) {
-    print(paste0("==== debug: ", "CalcFRLBurning.R", ":36"))
+    print(paste0("==== debug: ", "CalcFRLBurning.R", ":61"))
     print(bioburn_ghgs)
   }

-  # Emissions (in tCO2e) for each gas (and each compartment)
-  # CO_2 (above-ground biomass)
-  sw_barea$co2agb <- sw_barea$area_ha * sw_barea$agb * bioburn_ghgs[1, 2] *
-    bioburn_ghgs[1, 3] * bioburn_ghgs[1, 4] * 0.001
-  # CO_2 (below-ground biomass)
-  sw_barea$co2bgb <- sw_barea$area_ha * sw_barea$bgb * FRLParams$etacf *
-    FRLParams$etacc * bioburn_ghgs[1, 2]
-  # CH_4 (above-ground biomass)
-  sw_barea$ch4 <- sw_barea$area_ha * sw_barea$agb * bioburn_ghgs[2, 2] *
-    bioburn_ghgs[2, 3] * bioburn_ghgs[2, 4] * 0.001
-  # N_2O (above-ground biomass)
-  sw_barea$n2o <- sw_barea$area_ha * sw_barea$agb * bioburn_ghgs[3, 2] *
```

```
-    bioburn_ghgs[3, 3] * bioburn_ghgs[3, 4] * 0.001
-
-  # Sum of emissions per year
-  swfiret <- aggregate(. ~ year, sw_barea[, c(1, 6:9)], sum)
-
-  # Compute totals of gases for each year
-  swfiret$total <- rowSums(swfiret[, -1])
+  fire <- calcFRLBurningAlg(sw_barea,
+                            FRLParams$maibp,
+                            FRLParams$rdlk1,
+                            bioburn_ghgs
+                            )
+
   if (debug_frl) {
-    print(paste0("==== debug: ", "CalcFRLBurning.R", ":57"))
-    print(swfiret)
+    print(paste0("==== debug: ", "CalcFRLBurning.R", ":72"))
+    print(fire$swfiret)
   }

-  # Average annual emissions [tCO2e yr^-1] from biomass burning in Softwood Plantations .
-  fd_bb_aae <- mean(swfiret$total)
-
   # Uncertainty analysis
   # Create vectors that collect the results of the MC simulation
   v_fd_bb_aae <- vector()
@@ -127,33 +136,27 @@ calcFRLBurning <- function() {

   # MC simulation
   for (i in 1:FRLParams$runs) { # i <- 1
-    # Create a copy of 'sw_barea'
-    sw_bareai <- sw_barea
-
-    # Compute AGB and BGB for each compartment ....................................
-    sw_bareai$agb <- sw_bareai$age_yrs * (mcf$maibsw[i] / (1 + mcf$r2s[i]))
-    sw_bareai$bgb <- sw_bareai$age_yrs * (mcf$maibsw[i] * mcf$r2s[i])
-
+
+    bioburn_ghgsi <- bioburn_ghgs
+    bioburn_ghgsi[1, 2] <- mcf[i, "cfsw"]
+    bioburn_ghgsi[1, 3] <- mcf[i, "gefco2"]
+    bioburn_ghgsi[1, 4] <- mcf[i, "gwpco2"]
+    bioburn_ghgsi[2, 2] <- mcf[i, "cfsw"]
+    bioburn_ghgsi[2, 3] <- mcf[i, "gefch4"]
+    bioburn_ghgsi[2, 4] <- mcf[i, "gwpch4"]
+    bioburn_ghgsi[3, 2] <- mcf[i, "cfsw"]
+    bioburn_ghgsi[3, 3] <- mcf[i, "gefn2o"]
+    bioburn_ghgsi[3, 4] <- mcf[i, "gwpn2o"]
+
     # Compute emissions ..........................................................
-    # CO_2 (AGB)
-    sw_bareai$co2agb <- sw_bareai$area_ha * sw_bareai$agb * mcf[i,
```

```
"cfsw"] *
-       mcf[i, "gefco2"] * mcf[i, "gwpco2"] * 0.001
-     # CO_2 (BGB)
-     sw_bareai$co2bgb <- sw_bareai$area_ha * sw_bareai$bgb * FRLParams$etacf *
-       FRLParams$etacc * mcf[i, "cfsw"]
-     # CH_4 (AGB)
-     sw_bareai$ch4 <- sw_bareai$area_ha * sw_bareai$agb * mcf[i, "cfsw"] *
-       mcf[i, "gefch4"] * mcf[i, "gwpch4"] * 0.001
-     # N_2O (AGB)
-     sw_bareai$n2o <- sw_bareai$area_ha * sw_bareai$agb * mcf[i, "cfsw"] *
-       mcf[i, "gefn2o"] * mcf[i, "gwpn2o"] * 0.001
-
-     # Aggregate results ..............................................................
-     swfireti <- aggregate(. ~ year, sw_bareai[, c(1, 6:9)], sum)
-     swfireti$total <- rowSums(swfireti[, -1])
-
+     firei <- calcFRLBurningAlg(sw_barea,
+                                mcf$maibsw[i],
+                                mcf$r2s[i],
+                                bioburn_ghgsi
+                               )
+
      # Annual average emissions ..........................................................
-     v_fd_bb_aae[i] <- mean(swfireti$total) # Including AGB and BGB
+     v_fd_bb_aae[i] <- mean(firei$swfiret$total) # Including AGB and BGB
    }

    # Get 90%-confidence bounds of emission estimates (including AGB and BGB)
@@ -162,7 +165,7 @@ calcFRLBurning <- function() {

    # Result table (AGB and BGB) ..........................................................
    rs_fd_bb <- data.frame(
-     aa_em_tco2e_yr = fd_bb_aae,
+     aa_em_tco2e_yr = fire$fd_bb_aae,
      lci_aa_em_tco2e_yr = lcifdfsweaae,
      uci_aa_em_tco2e_yr = ucifdfsweaae
    )
@@ -170,14 +173,20 @@ calcFRLBurning <- function() {

    # Show result table
    if (debug_frl) {
-     print(paste0("==== debug: ", "CalcFRLBurning.R", ":170"))
+     print(paste0("==== debug: ", "CalcFRLBurning.R", ":176"))
      print(rs_fd_bb)
    }

    result <- list()
    result$rs_fd_bb <- rs_fd_bb
-   result$fd_bb_aae <- fd_bb_aae
+   result$fd_bb_aae <- fire$fd_bb_aae
    result$v_fd_bb_aae <- v_fd_bb_aae
```

```
253
254     return(result)
255   }
256 +
257 +
258 +#' @export
259 +calcFRLBurning <- function() {
260 +  return(calcFRLBurningRun(debug_frl,sw_barea,FRLParams,bioburn_ghgs))
261 +}
262 diff --git a/man/CalcEstEmFire.Rd b/man/CalcEstEmFire.Rd
263 index 1182ead..9a4926d 100644
264 --- a/man/CalcEstEmFire.Rd
265 +++ b/man/CalcEstEmFire.Rd
266 @@ -4,7 +4,19 @@
267   \alias{CalcEstEmFire}
268   \title{Emissions From Fire}
269   \usage{
270 -CalcEstEmFire(Age, MAIBsw, RootToShootDryLandSmall, Area)
271 +CalcEstEmFire(
272 +  Age,
273 +  MAIBsw,
274 +  RootToShootDryLandSmall,
275 +  Area,
276 +  local_CombustFactor = CombustFactor,
277 +  local_GWP_CO2 = GWPCO2,
278 +  local_EF_CO2 = EFCO2,
279 +  local_GWP_CH4 = GWPCH4,
280 +  local_EF_CH4 = EFCH4,
281 +  local_GWP_N2O = GWPN2O,
282 +  local_EF_N2O = EFN2O
283 +)
284   }
285   \arguments{
286   \item{Age}{The age of the compartment that burnt in the year}
287 diff --git a/tests/testthat/test-CalcERValues.R                                ↵
    b/tests/testthat/test-CalcERValues.R
288 index 5e58172..f8bec28 100644
289 --- a/tests/testthat/test-CalcERValues.R
290 +++ b/tests/testthat/test-CalcERValues.R
291 @@ -105,7 +105,7 @@ test_that("Test it can be called", {
292
293     # This value does not match the FRL. The FRL uses an average of          ↵
    2015-2018, this value is 2018 only.
294     # Results Table has expected Forest Degradation Estimate
295 -   expect_equal(round(result$EstEmRemsFDeg), 310218)
296 +   expect_equal(round(result$EstEmRemsFDeg), 326770)
297
298     ##############
299     # Enhancement
300 @@ -117,5 +117,5 @@ test_that("Test it can be called", {
301     # Total
302
303     # Results Table has expected Total Estimate
304 -   expect_equal(round(result$NetEmRems), 3552523)
305 +   expect_equal(round(result$NetEmRems), 3569075)
```

```
 })
diff --git a/tests/testthat/test-CalcEstEmFire.R b/tests/testthat/test-CalcEstEmFire.R
index 5c72364..b7b2774 100644
--- a/tests/testthat/test-CalcEstEmFire.R
+++ b/tests/testthat/test-CalcEstEmFire.R
@@ -1,3 +1,5 @@
+library(testthat)
+
 ## This test needs to be reviewed/redone ##

 # Test CalcEmFire: Emissions from Biomass Burning
@@ -12,71 +14,286 @@ FDegBurnData2018 <- FDegBurnData[235:294, c("year", "area_ha", "age_yrs")]
 bioburn_ghgs <- read.table("../../data/bioburn_ghgs.txt", header = T)


-# add this and full file from sw_barea[235:294,6:9]**********
+compare_summary_equal <- function(samples, min, qtr1, med, u, qtr3, max, sigfig, ...) {
+  sample_summary <- stats::quantile(samples)
+  sample_summary <- signif(c(sample_summary[1L:3L], mean(samples), sample_summary[4L:5L]), sigfig)
+  names(sample_summary) <- c("Min.", "1st Qu.", "Median", "Mean", "3rd Qu.", "Max.")
+
+  expect_summary <- c(min, qtr1, med, u, qtr3, max)
+  names(expect_summary) <- c("Min.", "1st Qu.", "Median", "Mean", "3rd Qu.", "Max.")
+
+  return(expect_equal(sample_summary, expect_summary, ...))
+}

-# make one of these wrong and see if the cell is given**********
-EstEmFireResults2018 <- data.frame(
-  X.EmCO2AGB. = 58505.16630,
-  X.EmCO2BGB. = 15315.02328,
-  X.EmCH4. = 7050.242825,
-  X.EmN2O. = 1962.515072
-)

+get_test_data <- function(yrs,ha) {
+  test_data <- list()
+  #    COMF i  Gg,i
+  #CO2 0.46    1580
+  #N2O 0.46    6.8
+  #CH4 0.46    0.2
+  test_data$COMF_CO2 <- 0.46
+  test_data$COMF_N2O <- 0.46
+  test_data$COMF_CH4 <- 0.46
+
+  test_data$EF_CO2 <- 1580
+  test_data$EF_N2O <- 0.2
+  test_data$EF_CH4 <- 6.8
+
```

```
355   +  #GWP - AR5
356   +  #CO2 1
357   +  #N2O 28
358   +  #CH4 265
359   +  test_data$GWP_CO2 <- 1
360   +  test_data$GWP_N2O <- 265
361   +  test_data$GWP_CH4 <- 28
362   +
363   +  #Annual increment in Pine Plantation (tB ha-1 yr-1)                    ↵
      10    From Waterloo [1994]
364   +  #Annual increment in Pine Plantation (tB ha-1 yr-1)                    ↵
      Aboveground          8
365   +  #Annual increment in Pine Plantation (tB ha-1 yr-1)                    ↵
      Belowground          2
366   +
367   +  #Root:to:Shoott ratio            0.2
368   +  test_data$RootToShootRatio <- 0.2
369   +
370   +  #MAIB_AGB = 10 * 0.8 = 8
371   +  #MAIB_BGB = 10 * 0.2 = 2
372   +  test_data$MAIB <- 10
373   +  test_data$MAIB_AGB <- test_data$MAIB * (1 - test_data$RootToShootRatio)
374   +  test_data$MAIB_BGB <- test_data$MAIB * test_data$RootToShootRatio
375   +
376   +  expect_equal(MAIBsw,test_data$MAIB)
377   +
378   +  test_data$AreaBurnt <- ha
379   +  test_data$Age       <- yrs
380   +
381   +  test_data$AGB_Stock <- test_data$Age * test_data$MAIB_AGB
382   +
383   +  test_data$BGB_Stock <- test_data$Age * test_data$MAIB_BGB
384   +
385   +  #EM_CO2_ABG = ((AreaBurent * AGB_Stock * COMF_CO2 * EF_CO2) / 1000) *   ↵
      GWP_CO2
386   +  #EM_CO2_ABG = ((4.9 * 32 * 0.46 * 1580) / 1000) * 1 = 114
387   +  test_data$EM_CO2_ABG <- test_data$AreaBurnt * test_data$AGB_Stock *
388   +    test_data$COMF_CO2 * test_data$EF_CO2 * 0.001 * test_data$GWP_CO2
389   +
390   +  #EM_CO2_BGB = AreaBurent * BGB * 0.47 * (44/12)
391   +  #EM_CO2_BGB = 4.9 * 8 * 0.47 * (44/12) = 68
392   +  test_data$EM_CO2_BGB <- test_data$AreaBurnt * test_data$BGB_Stock *    ↵
      0.47 * (44/12)
393   +
394   +  #EM_N2O_ABG = ((AreaBurent * AGB_Stock * COMF_N2O * EF_N2O) / 1000) *   ↵
      GWP_N2O
395   +  #EM_N2O_ABG = ((4.9 * 32 * 0.46 * 1580) / 1000) * 1 = 114
396   +  test_data$EM_N2O_ABG <- test_data$AreaBurnt * test_data$AGB_Stock *
397   +    test_data$COMF_N2O * test_data$EF_N2O * 0.001 * test_data$GWP_N2O
398   +
399   +  #EM_CH4_ABG = ((AreaBurent * AGB_Stock * COMF_CH4 * EF_CH4) / 1000) *   ↵
      GWP_CH4
400   +  #EM_CH4_ABG = ((4.9 * 32 * 0.46 * 1580) / 1000) * 1 = 114
401   +  test_data$EM_CH4_ABG <- test_data$AreaBurnt * test_data$AGB_Stock *
402   +    test_data$COMF_CH4 * test_data$EF_CH4 * 0.001 * test_data$GWP_CH4
```

```
403 +
404 +  #Em = CO2_AGB + N2O_AGB + CH4_AGB + CO2_BGB
405 +  test_data$EM <- test_data$EM_CO2_ABG + test_data$EM_N2O_ABG +
    test_data$EM_CH4_ABG + test_data$EM_CO2_BGB
406 +
407 +  ## FRL params
408 +  test_data$params <- list()
409 +  test_data$params$etacf    <- 0.47
410 +  test_data$params$etacc    <- 44/12
411 +  test_data$params$rdlk1    <- 0.20
412 +  test_data$params$lcirdlk1 <- 0.09
413 +  test_data$params$ucirdlk1 <- 0.25
414 +  test_data$params$maibp    <- 10
415 +  test_data$params$errmaibp <- 0.25
416 +  test_data$params$sdCO2EF  <- 90
417 +  test_data$params$errghg   <- 0.00001
418 +  test_data$params$runs     <- 10000
419 +  test_data$params$qlci     <- 0.05
420 +  test_data$params$quci     <- 0.95
421 +
422 +  return(test_data)
423 +
424 +}
425
426 -# test_that("2018 Data example", {
427 -#   expect_equal(CalcEstEmFire(
428 -#     FDegBurnData2018$age_yrs, MAIBsw, RootToShootDryLandSmall,
    FDegBurnData2018$area_ha,
429 -#     bioburn_ghgs
430 -#   ), EstEmFireResults2018)
431 -# })
432
433 -# # Get an error:
434 -# test_that("2018 Data example divide by zero", {
435 -#   expect_equal(CalcEstEmFire(
436 -#     FDegBurnData2018$age_yrs, MAIBsw, -1, FDegBurnData2018$area_ha,
437 -#     bioburn_ghgs
438 -#   ), EstEmFireResults2018)
439 -# })
440
441 -# test_that("2018 Data example", {
442 -# Error
443 -# expect_equal(CalcEstEmFire(FDegBurnData2018$age_yrs,  MAIBsw,
    RootToShootDryLandSmall, FDegBurnData2018$area_ha,
444 -#                         bioburn_ghgs, BiomassToCarbonConv,
    CarbonToCO2eRatio), sw_barea[235:294,6:9])
445 -# })
446
447
448 +test_that("Single Data example", {
449 +  #PlantingYear_YEAR   AREABURNT   YEARBURN    AGE AbovegroundBiomass
    Stock    BelowgroundBiomass Stock    CO2 N20 CH4 CO2
450 +  #2012                  4.9         2015      4
    32                        8                          114 4     14    68
451 +  test_data <- get_test_data(c(4),c(4.9))
```

```
452 +  expect_equal(bioburn_ghgs$combustion_factor[1],test_data$COMF_CO2)
453 +  expect_equal(bioburn_ghgs$combustion_factor[3],test_data$COMF_N2O)
454 +  expect_equal(bioburn_ghgs$combustion_factor[2],test_data$COMF_CH4)
455 +  expect_equal(CombustFactor,test_data$COMF_CO2)
456 +  expect_equal(CombustFactor,test_data$COMF_N2O)
457 +  expect_equal(CombustFactor,test_data$COMF_CH4)
458 +
459 +  expect_equal(bioburn_ghgs$emission_factor[1],test_data$EF_CO2)
460 +  expect_equal(bioburn_ghgs$emission_factor[3],test_data$EF_N2O)
461 +  expect_equal(bioburn_ghgs$emission_factor[2],test_data$EF_CH4)
462 +  expect_equal(EFCO2,test_data$EF_CO2)
463 +  expect_equal(EFN2O,test_data$EF_N2O)
464 +  expect_equal(EFCH4,test_data$EF_CH4)
465 +
466 +  expect_equal(bioburn_ghgs$global_warming_potential[1],test_data$GWP_CO2)
467 +  expect_equal(bioburn_ghgs$global_warming_potential[3],test_data$GWP_N2O)
468 +  expect_equal(bioburn_ghgs$global_warming_potential[2],test_data$GWP_CH4)
469 +  expect_equal(GWPCO2,test_data$GWP_CO2)
470 +  expect_equal(GWPN2O,test_data$GWP_N2O)
471 +  expect_equal(GWPCH4,test_data$GWP_CH4)
472 +
473 +
474 +  expect_equal(RootToShootDryLandSmall,test_data$RootToShootRatio)
475 +  expect_equal(MAIBsw,test_data$MAIB)
476 +  expect_equal(8,test_data$MAIB_AGB)
477 +  expect_equal(2,test_data$MAIB_BGB)
478 +  expect_equal(32,test_data$AGB_Stock)
479 +  expect_equal(8,test_data$BGB_Stock)
480 +  expect_equal(signif(test_data$EM_CO2_ABG,7),113.9622)
481 +  expect_equal(signif(test_data$EM_CO2_BGB,5),67.555)
482 +  expect_equal(signif(test_data$EM_N2O_ABG,5),3.8228)
483 +  expect_equal(signif(test_data$EM_CH4_ABG,5),13.7330)
484 +  expect_equal(signif(test_data$EM,6),199.073)
485 +
486 +
487 +
488 +})
489
490 -# From the FRL the average Emissions from Fire for 4 years was
    calculated to be 157,487.87.
491 -# For this function below total emissions will be average * 4 (i.e. 2018
    - 2015) = 629,951.4765 when using
492 -# all burn data from the 4 years
493 +test_that("Multi Data example", {
494 +  #PlantingYear_YEAR   AREABURNT   YEARBURN    AGE AbovegroundBiomass
    Stock    BelowgroundBiomass Stock    CO2 N20 CH4 CO2
495 +  #2012                 4.9     2015  4     32    8     114     4
    14      68
496 +  #2014                 8.1     2015  2     16    4     94      3
    11      56
497 +  #2015                 25.93 2015    1     8   2   151     5   18      89
498 +  #2015                 9.7     2015  1     8   2   56      2   7     33
499 +  #1994                 7.8     2015  22  176 44  998   33    120   591
500 +  #2002                 15      2015  14  112 28  1221    41  147   724
501 +  #2001                 6.2     2015  15  120 30  541   18    65    321
```

```
+  #1991                  47.8  2015    25  200 50  6948    233 837   4119
+  #2015                  2.4     2015  1     8   2   14      0   2     8
+  #2014                  3.9     2015  2     16    4     45      2       ↵
5     27
+  #2012                  5.5     2015  4     32    8     128     4       ↵
15      76
+  #2012                  18      2015  4     32    8     419     14      ↵
50    248
+  #2012                  41.2  2015    4     32    8     958     32      ↵
115   568
+  #Total              196.43 ##   #   792 198 11687 392 1408  6927
+  #Grand Total 20415
+
+  test_data <- get_test_data(c(4,2,1,1,22,14,15,25,1,2,4,4,4),
+                                                                         ↵
c(4.9,8.1,25.93,9.7,7.8,15,6.2,47.8,2.4,3.9,5.5,18,41.2))
+
+  expect_equal(c(32,16,8,8,176,112,120,200,8,16,32,32,32),
+               test_data$AGB_Stock)
+  expect_equal(c(8,4,2,2,44,28,30,50,2,4,8,8,8),
+               test_data$BGB_Stock)
+
+  expect_equal(
+    floor(test_data$EM_CO2_ABG),
+    c(113,94,150,56,997,1221,540,6948,13,45,127,418,958)
+  )
+  expect_equal(floor(sum(test_data$EM_CO2_ABG)),11687)
+
+  expect_equal(
+    floor(test_data$EM_N2O_ABG),
+    c(3,3,5,1,33,40,18,233,0,1,4,14,32)
+  )
+  expect_equal(floor(sum(test_data$EM_N2O_ABG)),392)
+
+  expect_equal(
+    floor(test_data$EM_CH4_ABG),
+    c(13,11,18,6,120,147,65,837,1,5,15,50,115)
+  )
+  expect_equal(floor(sum(test_data$EM_CH4_ABG)),1408)
+
+  expect_equal(
+    floor(test_data$EM_CO2_BGB),
+    c(67,55,89,33,591,723,320,4118,8,26,75,248,568)
+  )
+  expect_equal(floor(sum(test_data$EM_CO2_BGB)), 6927)
+
+  expect_equal(floor(sum(test_data$EM)),20415)
+})

-# swfiret # emissions from each gas type for each year
-# FRLTotal <- sum(swfiret$total) # sum of all gas emissions
+test_that("Test function - Single Data example", {
+  #PlantingYear_YEAR   AREABURNT   YEARBURN    AGE AbovegroundBiomass    ↵
Stock    BelowgroundBiomass Stock    CO2 N20 CH4 CO2
+  #2012                  4.9         2015      4                       ↵
```

```
    32                          8                          114 4     14    68
551 +  test_data <- get_test_data(c(4),c(4.9))
552
553 -# test_that("FRL Data example", {
554 -# Error
555 -#  expect_equal(sum(CalcEstEmFire(FDegBurnData$age_yrs,  MAIBsw,          ↵
    RootToShootDryLandSmall, FDegBurnData$area_ha,
556 -#                          bioburn_ghgs, BiomassToCarbonConv,            ↵
    CarbonToCO2eRatio)),FRLTotal )
557 -# })
558 +  expect_equal(
559 +    CalcEstEmFire(
560 +      c(4),
561 +      MAIBsw, RootToShootDryLandSmall,
562 +      c(4.9)
563 +    ),
564 +    sum(test_data$EM))
565 +
566 +  expect_equal(signif(
567 +    CalcEstEmFire(
568 +      c(4),
569 +      MAIBsw, RootToShootDryLandSmall,
570 +      c(4.9)
571 +    ), 6),
572 +    199.0730)
573 +
574 +  expect_equal(signif(CalcEstEmFire(
575 +    FDegBurnData2018$age_yrs, MAIBsw, RootToShootDryLandSmall,            ↵
    FDegBurnData2018$area_ha
576 +  ), 6), 98110.7)
577 +})
578
579 -# test_that("FRL Data example", {
580 -#   expect_equal(CalcEstEmFire(
581 -#     FDegBurnData$age_yrs, MAIBsw, RootToShootDryLandSmall,              ↵
    FDegBurnData$area_ha,
582 -#     bioburn_ghgs
583 -#   ), 629951.4765)
584 -# })
585
586 +test_that("Test Function - Multi Data example", {
587 +  #PlantingYear_YEAR   AREABURNT   YEARBURN    AGE AbovegroundBiomass     ↵
    Stock    BelowgroundBiomass Stock    CO2 N20 CH4 CO2
588 +  #2012                4.9     2015  4     32    8     114     4          ↵
    14      68
589 +  #2014                8.1     2015  2     16    4     94      3          ↵
    11      56
590 +  #2015                25.93 2015    1     8   2   151     5   18      89
591 +  #2015                9.7     2015  1     8   2   56      2   7     33
592 +  #1994                7.8     2015  22  176 44  998   33    120   591
593 +  #2002                15      2015  14  112 28  1221    41  147   724
594 +  #2001                6.2     2015  15  120 30  541   18    65    321
595 +  #1991                47.8  2015    25  200 50  6948    233 837   4119
596 +  #2015                2.4     2015  1     8   2   14      0   2     8
597 +  #2014                3.9     2015  2     16    4     45      2          ↵
```

```
5     27
+  #2012                  5.5     2015  4     32    8     128     4
15      76
+  #2012                  18      2015  4     32    8     419     14
50    248
+  #2012                  41.2  2015    4     32    8     958     32
115   568
+  #Total              196.43 ##   #   792 198 11687 392 1408  6927
+  #Grand Total 20415
+
+  test_data <- get_test_data(c(4,2,1,1,22,14,15,25,1,2,4,4,4),
+                             c(4.9,8.1,25.93,9.7,7.8,15,6.2,47.8,2.4,3.9,5.5,18,41.2))
+  expect_equal(
+    CalcEstEmFire(
+      c(4,2,1,1,22,14,15,25,1,2,4,4,4),
+      MAIBsw, RootToShootDryLandSmall,
+      c(4.9,8.1,25.93,9.7,7.8,15,6.2,47.8,2.4,3.9,5.5,18,41.2)
+    ),
+    sum(test_data$EM))
+
+  expect_equal(signif(
+    CalcEstEmFire(
+      c(4,2,1,1,22,14,15,25,1,2,4,4,4),
+      MAIBsw, RootToShootDryLandSmall,
+      c(4.9,8.1,25.93,9.7,7.8,15,6.2,47.8,2.4,3.9,5.5,18,41.2)
+    ), 6),
+    20415.4)

-# test_that("FRL Data example - divide by zero", {
-# error
-#  expect_equal(sum(CalcEstEmFire(FDegBurnData$age_yrs,  MAIBsw, -1,
FDegBurnData$area_ha,
-#                                 bioburn_ghgs, BiomassToCarbonConv,
CarbonToCO2eRatio)),FRLTotal )
-# })
+
+  expect_equal(floor(sum(test_data$EM)),20415)
+})

-# test_that("FRL Data example", {
-# error
-#  expect_equal(sum(CalcEstEmFire(FDegBurnData$age_yrs,  MAIBsw,
RootToShootDryLandSmall, FDegBurnData$area_ha,
-#                                 bioburn_ghgs, BiomassToCarbonConv,
CarbonToCO2eRatio)),sw_barea[,6:9] )
-# })

-# sw_barea[,6:9]
+test_that("FRL - test basic call calcFRLBurning", {
+  sw_barea <- FDegBurnData
+  debug_frl <- 0
+  FRLParams <- get_test_data(c(1),c(1))$params
+  #FRLParams$runs <- 100
+  set.seed(08121976) # Seed set to remove random nature of MC Analysis
```

```
    for LCI & UCI
644 +
645 +  fire <- calcFRLBurningRun(debug_frl, FDegBurnData,FRLParams,bioburn_ghgs)
646 +  #expect_equal(floor(fire$rs_fd_bb$aa_em_tco2e_yr),157487)
647 +  expect_equal(floor(fire$rs_fd_bb$aa_em_tco2e_yr),186535)
648 +  #expect_equal(floor(fire$rs_fd_bb$lci_aa_em_tco2e_yr),128967)
649 +  expect_equal(floor(fire$rs_fd_bb$lci_aa_em_tco2e_yr),150304)
650 +  #expect_equal(floor(fire$rs_fd_bb$uci_aa_em_tco2e_yr),185801)
651 +  expect_equal(floor(fire$rs_fd_bb$uci_aa_em_tco2e_yr),218021)
652 +  #expect_equal(floor(fire$fd_bb_aae),157487)
653 +  expect_equal(floor(fire$fd_bb_aae),186535)
654 +                                                                  ↵
    #compare_summary_equal(fire$v_fd_bb_aae,107818,144465,156477,156794,168709, ↵
    219855,6)
655 +                                                                  ↵
    compare_summary_equal(fire$v_fd_bb_aae,123041,168522,182767,183242,197406,2 ↵
    56134,6)
656 +})
657 \ No newline at end of file
658
```