

Annex 3 - R script to construct Table 1A by country

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Filling of the EU-MAP table 1A requires to report on country shares of landings and shares of EU TAC when relevant, for all the stocks listed in table 1A of the EU-MAP Regulation (EU Decision 1254/2016). This process necessitates to gather information on landings and EU TAC from an official database, namely EUROSTAT for EU landings and MARE/FIDES for EU TAC.

Two datasets were added to complete the references, (1) the Nephrops FU landings provided by ICES and (2) the Mediterranean and Black Sea landings figures put together by 2016 RCM Mediterranean and Black Sea.

First of all, the datasets listed above contain information from all EU Member States, which means that the script has the potential to be used by all Member States, and by STECF for control of the NWP submitted for 2017.

Setting the parameters for the analysis

The variables needed for the work are the working directory, the country code (2-letter code) and the reference years

```
library(tidyr)
library(stringr)
library(reshape)

##
## Attaching package: 'reshape'
## The following objects are masked from 'package:tidyr':
##
##     expand, smiths
library(dplyr)

##
## Attaching package: 'dplyr'
## The following object is masked from 'package:reshape':
##
##     rename
## The following objects are masked from 'package:stats':
##
##     filter, lag
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
CTRY <- 'DK'
refYears <- 2016:2018
```

Importing the datasets

The list of datasets are the following :

1. Landings and TAC shares files:

- EUROSTAT landings files: <http://ec.europa.eu/eurostat/web/fisheries/data/database>
- MARE/FIDES TAC file: <https://webgate.ec.europa.eu/fides/index.cfm>
- ICES Nephrops fishery units landings per country for 2015
- RCM Mediterranean and Black Sea 2016 landings compilation

```
DF27 <- read.table(file.path(input_path_common, "fish_ca_atl27.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF21 <- read.table(file.path(input_path_common, "fish_ca_atl21.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF34 <- read.table(file.path(input_path_common, "fish_ca_atl34.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF41 <- read.table(file.path(input_path_common, "fish_ca_atl41.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF47 <- read.table(file.path(input_path_common, "fish_ca_atl47.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF51 <- read.table(file.path(input_path_common, "fish_ca_ind51.tsv"),header=TRUE, sep='\t', as.is=TRUE)
DF37 <- read.table(file.path(input_path_common, "fish_ca_atl37.tsv"),header=TRUE, sep='\t', as.is=TRUE)

DF <- rbind.data.frame(DF27, DF21)
DF <- rbind.data.frame(DF, DF34)
DF <- rbind.data.frame(DF, DF37)
DF <- rbind.data.frame(DF, DF41)
DF <- rbind.data.frame(DF, DF47)
DF <- rbind.data.frame(DF, DF51)

TAC <- read.csv(file.path(input_path_common, 'EU opening quota 2018.csv'), header=TRUE, sep=';', as.is=TRUE)
NEP <- read.csv(file.path(input_path_common, 'Nephrops landings 2015.csv'), header=TRUE, sep=';', as.is=TRUE)
patch_land_codIIa <- read.table(file.path(input_path_common, 'patch_codIIa_20191009.txt'), sep = '\t', as.is=TRUE)
MED <- read.csv(file.path(input_path_common, 'RCM MED landings.csv'), header=TRUE, sep=';', as.is=TRUE)
```

2. Reference tables:

- EuroStat Geo.def: full names of countries
- ASFIS file : FAO species naming and coding
- Linkage table mirroring EU-MAP Table 1A naming of species and stock area, and lining to EUROSTAT and MARE/FIDES species and area naming

```
GEO <- read.table(file.path(input_path_common, 'geo.def'),header=TRUE, sep=";", as.is=TRUE)
ASFIS <- read.table(file.path(input_path_common, 'ASFIS_sp_Feb_2016.txt'), header=TRUE, sep="\t", as.is=TRUE)
table1A <- read.csv(file.path(input_path_dnk, 'EUMAP_Table1A_Linkage_EUROSTAT and EC_TAC_dnk.csv'), sep=
```

data.frame preparation

The country names are matching between GEO and TAC data.frame, except for UK, so the following lines enables the full match.

```
TAC$StockID <- paste(TAC$Species.Code, TAC$Area.Code, sep="")
TAC$Level.Description[substring(TAC$Level.Description, 1, 3) %in% 'U.K'] <- 'United Kingdom'
```

The TAC dataset is well structured and thus ready for the analysis

```
head(TAC, 3)
```

```
## Load_ind Definition.Year Species.Code
## 1 INIV 2018 AGO_CSQ
## 2 INIV 2018 AGO_CSQ
## 3 INIV 2018 AGO_CSQ
##
## Species.Name Area.Code
## 1 Angola direct agreement fishing category (Coastal State quota) DIR_AG
## 2 Angola direct agreement fishing category (Coastal State quota) DIR_AG
## 3 Angola direct agreement fishing category (Coastal State quota) DIR_AG
```

```
##      Area.Description Level.Code Level.Description Initial.Quantity
## 1 Direct Agreements      BEL      Belgium      NA
## 2 Direct Agreements      BGR      Bulgaria      NA
## 3 Direct Agreements      CYP      Cyprus      NA
##      Adapted.Quota Eurlex.Ref OJ.Ref Publication.Date Page.Number
## 1      NA 32017R2403      L347      2017-12-28      81
## 2      NA 32017R2403      L347      2017-12-28      81
## 3      NA 32017R2403      L347      2017-12-28      81
##      In.regulation Compute.uptake      StockID
## 1      Y      Y AGO_CSQDIR_AG
## 2      Y      Y AGO_CSQDIR_AG
## 3      Y      Y AGO_CSQDIR_AG

names(GEO)[2] <- "Country"
GEO$geo <- toupper(GEO$geo) #2-letter code should be in capitals
SRG <- strsplit(as.character(DF$species.fishreg.unit.geo.time),split=",")
SRG.m <- matrix(unlist(SRG), ncol=4, byrow=TRUE)
coln <- sapply(refYears, function(x) which(grepl(x,names(DF))))
DFT <- data.frame(X3A_CODE = toupper(SRG.m[,1]), area = toupper(SRG.m[,2]), geo = SRG.m[,4],
Y1 = DF[,coln[1]], Y2 = DF[,coln[2]], Y3 = DF[,coln[3]])
DFM <- merge(DFT, GEO, all.x=TRUE)
DFM$Y1 <- as.numeric(str_remove_all(as.character(DFM$Y1), "[bcdefinpzsu]")) #Removing characters in am
DFM$Y2 <- as.numeric(str_remove_all(as.character(DFM$Y2), "[bcdefinpzsu]")) #Removing characters in am
DFM$Y3 <- as.numeric(str_remove_all(as.character(DFM$Y3), "[bcdefinpzsu]")) #Removing characters in am
DFM <- DFM[!is.na(DFM$Country),]
DFM <- merge(DFM, ASFIS[,c(3:6)], all.x=TRUE)
```

Let's have a look at the workable structure of EuroStat dataset. Note that Y1, Y2 and Y3 are the 3-year period demanded, and the presence of NA's. The assumption made here (further in the Construction of the table section) is to exclude NA from the average, i.e. like if MS had omitted to report, instead of a NA which would mean 0. The confusion comes because lots of 0 are reported in EuroStat (implicitly meaning that NA is not a 0). This point may be subject of a STECF agreement or suggestion for modification.

```
head(DFM,3)

##      X3A_CODE geo      area  Y1 Y2 Y3      Country
## 1      AAS EU28 27_3_C_22  NA NA NA European union (28 MS)
## 2      AAS EU28 27_4_B 0.03 NA NA European union (28 MS)
## 3      AAS DK 27_4 0.03 NA NA      Denmark
##      Scientific_name English_name      French_name
## 1 Astacus astacus Noble crayfish Écrevisse à pieds rouges
## 2 Astacus astacus Noble crayfish Écrevisse à pieds rouges
## 3 Astacus astacus Noble crayfish Écrevisse à pieds rouges

NEP <- merge(NEP, GEO, all.x=TRUE)
NEP$geo[is.na(NEP$geo)] <- 'UK'
NEP2 <- data.frame(X3A_CODE='NEP', geo=NEP$geo, area=NEP$Stock, Y1=round(NEP$TotalLanding.in.kg/1000,0))
```

A look at the Nephrops dataset on the same format as EuroStat dataset, so they can be merged

```
head(NEP2)

##      X3A_CODE geo      area  Y1 Y2 Y3 Country      Scientific_name English_name
## 1      NEP BE nep-22  5 NA NA Belgium Nephrops norvegicus Norway lobster
## 2      NEP BE nep-15  0 NA NA Belgium Nephrops norvegicus Norway lobster
## 3      NEP BE nep-33 299 NA NA Belgium Nephrops norvegicus Norway lobster
## 4      NEP BE nep-5 146 NA NA Belgium Nephrops norvegicus Norway lobster
```

```
## 5      NEP  BE nep-14    0 NA NA Belgium Nephrops norvegicus Norway lobster
## 6      NEP  BE  nep-6    0 NA NA Belgium Nephrops norvegicus Norway lobster
##   French_name
## 1 Langoustine
## 2 Langoustine
## 3 Langoustine
## 4 Langoustine
## 5 Langoustine
## 6 Langoustine
```

```
DFM <- rbind.data.frame(DFM, NEP2)
MEDA <- merge(MED, ASFIS[,c(3,4,5,6)], by.x='Species', by.y='Scientific_name', all.x=TRUE)
MEDA <- tidyr::gather(MEDA, "Country", "n", 4:13)
MEDAG <- merge(MEDA, GEO, all.x=TRUE)
```

and a look at the Mediterranean dataset

```
head(MEDAG,3)
```

```
##   Country      Species      Area RefYears
## 1 Bulgaria Alopias vulpinus All areas in the Med 2013-2015
## 2 Bulgaria Anguilla anguilla all areas in the Med 2013-2015
## 3 Bulgaria   Aphia minuta   GSA 9,10,16 and 19 2013-2015
##   Total.average.landings..t. X3A_CODE      English_name      French_name n
## 1              9.0      ALV      Thresher      Renard 0
## 2             308.0      ELE      European eel Anguille d'Europe 0
## 3             50.7      FIM Transparent goby      Nonnat 0
##   geo
## 1 BG
## 2 BG
## 3 BG
```

```
MED <- data.frame(X3A_CODE=MEDAG$X3A_CODE, geo=MEDAG$geo, area=MEDAG$Area, Y1=round(MEDAG$n,0),
                  Y2=NA, Y3=NA, Country=MEDAG$Country, Scientific_name=MEDAG$Species, English_name=MEDAG$English_name,
                  French_name=NA)
DFM <- rbind.data.frame(DFM, MED)
```

Construction of the table

```
T1A <- data.frame()
for (i in 1:nrow(table1A)) {

  ctry2 <- GEO$Country[GEO$geo %in% CTRY]
  reg <- strsplit(as.character(table1A$areaBis[i]), split=',')

  if (table1A$region[i] %in% 'Mediterranean and Black Sea') {
    DT <- DFM[DFM$Scientific_name %in% table1A$latinName[i] & tolower(DFM$area) %in% tolower(paste(
    ) else {

      ting<-unlist(strsplit(table1A$latinName[i], split=","))
      DT <- DFM[DFM$Scientific_name %in% ting & tolower(DFM$area) %in% tolower(reg[[1]]),]

    }

  if (table1A$latinName[i]=="Gadus morhua" & (table1A$area[i] %in% c("IIIaN","IIIaS"))) & sum(refYears
```

```

{
  a<-melt(DT[c("geo","Y1","Y2","Y3")])
  a$id<-paste(a$geo,a$variable)
  patch_land_codIIa$id <- paste0(patch_land_codIIa$geo, " Y", patch_land_codIIa$year_seq)
  a<-data.frame(a, b=patch_land_codIIa[,table1A$area[i]][match(a$id, patch_land_codIIa$id)]*a$value)
  DT[,4:6]<-matrix(data=a$b, ncol=3)
}

DT$MOY <- apply(DT[,4:6],1,mean,na.rm=TRUE)
#RFMO <- 'ICES'
if (substring(table1A$region[i],1,3) %in% 'Med') RFMO <- 'GFCM'

T1 <- data.frame(MS=CTRY, refYears=paste(min(refYears),'-',max(refYears),sep=""),spp=table1A$latinName,
  RFMO=table1A$RFMO[i], area = table1A$area[i],select=NA, landings=NA, TAC=NA,shareLanding=NA,Thresh=NA)
ind <- which(DT$geo %in% CTRY)
if (length(ind)>0) {
  T1$landings <- sum(DT$MOY[DT$geo %in% CTRY],na.rm=TRUE)
  T1$shareLanding <- T1$landings/sum(DT$MOY[DT$geo != 'EU28'], na.rm=TRUE)
  #T1$shareLanding <- T1$landings/sum(DT$MOY, na.rm=TRUE)
} else {
  T1$landings <- 0
  T1$shareLanding <- 0
}

## TAC
ind.ct<-NULL
if (!(table1A$FIDES_stockID[i] %in% 'No TAC')) {
  aa<-strsplit(as.character(table1A$FIDES_stockID[i]),split=',')[[1]]
  TACi <- TAC[TAC$StockID %in% aa,]
  if (length(aa)>1)
    TACi <- aggregate(list(Initial.Quantity = TACi$Initial.Quantity),
      by=list(Level.Code=TACi$Level.Code, Level.Description=TACi$Level.Description), sum)
  ind.ct <- TACi$Initial.Quantity[which(TACi$Level.Description %in% ctry2)]
  ind.eu <- TACi$Initial.Quantity[which(TACi$Level.Code %in% 'EEC')]
  if (length(ind.ct) == 1) T1$TAC <- ind.ct/ind.eu
  T1$Comments<-NA
  TT <- tapply(TACi$Initial.Quantity, TACi$Level.Description,sum,na.rm=TRUE)/TACi$Initial.Quantity
  TT <- TT[names(TT) %in% GEO$Country] #Keep only the EU countries to calculate the 25% rule
  if (!(is.na(T1$TAC)) & T1$TAC <0.1 & T1$TAC>0) T1$Comments <- sum(TT[which(TT<0.1)])
  if (!(is.na(T1$Comments)) & T1$Comments >=.25) {
    print(T1)
    print(TT[TT<.1])
    cat('\n')
  }
}

#Add-on Sept 2019 Joel
if (length(ind.ct)>0) {
  if (!is.na(ind.ct)) {
    T1$Comments2 <- paste('FIDES Initial.Quantity =',ind.ct)
  }}
##
T1A <- rbind.data.frame(T1A, T1)
T1A$Thresh <- as.character(T1A$Thresh)

```

```

#Threshold ruling
# T1A$Thresh[T1A$TAC >=.1 & T1A$landings >=200] <- 'M' #rule (a) & (c)
# T1A$Thresh[is.na(T1A$TAC) & T1A$shareLanding >=.1 & T1A$landings >=200] <- 'M' #rule (b) & (c)
# T1A$Thresh[T1A$TAC <.1 & T1A$Comments >=.25] <- 'C' # 25% rule, sampling to be coordinated between
#Threshold ruling specified like the EU Reg
T1A$Thresh[T1A$TAC <.1] <- 'Y' #rule (a)
T1A$Thresh[is.na(T1A$TAC) & T1A$shareLanding <.1] <- 'Y' #rule (b)
T1A$Thresh[T1A$landings < 200] <- 'Y' #rule (c)
T1A$Thresh[T1A$TAC <.1 & T1A$Comments >=.25] <- 'N' # 25% rule, sampling to be coordinated between
}

```

```
## Using geo as id variables
```

```
## Using geo as id variables
```

```

## MS refYears spp region RFMO area
## 1 DK 2016-2018 Macrourus berglax North Sea and Eastern Arctic ICES IV
## select landings TAC shareLanding Thresh Comments Comments2
## 1 NA 0 0.1 0 N 0.3 NA
## Denmark Germany United Kingdom
## 0.1 0.1 0.1
##
## MS refYears spp region RFMO
## 1 DK 2016-2018 Scomber scombrus North Atlantic ICES
## area select landings TAC shareLanding
## 1 II,IIIa,IV,V,VI,VII,VIII,IX NA 37314.99 0.08336916 0.08313482
## Thresh Comments Comments2
## 1 N 0.290335 NA
## Belgium Denmark Estonia France Germany
## 1.412206e-03 8.336916e-02 4.680145e-04 4.208049e-02 5.791407e-02
## Latvia Lithuania Netherlands Poland Spain
## 3.455688e-04 3.455688e-04 8.678675e-02 3.972681e-03 5.986232e-05
## Sweden
## 1.358058e-02
##
## MS refYears spp region RFMO area select landings
## 1 DK 2016-2018 Sprattus sprattus Baltic Sea ICES 22-32 NA 23341.25
## TAC shareLanding Thresh Comments Comments2
## 1 0.09864283 0.09847156 N 0.2628188 NA
## Denmark Finland Germany Lithuania
## 0.09864283 0.05163738 0.06249476 0.05004384
##
## MS refYears spp region RFMO
## 1 DK 2016-2018 Trachurus trachurus North Atlantic ICES
## area select landings TAC
## 1 IIa,IVa,Vb,VIa,VIIa-c,e-k,VIIIabde NA 6839.608 0.09913542
## shareLanding Thresh Comments Comments2
## 1 0.1060762 N 0.3265306 NA
## Belgium Denmark France Germany Latvia
## 0.000000000 0.099135418 0.039810998 0.077349955 0.000000000
## Lithuania Portugal Sweden United Kingdom
## 0.000000000 0.010163869 0.006785966 0.093284407
##
## MS refYears spp region RFMO area
## 1 DK 2016-2018 Trachurus trachurus North Sea and Eastern Arctic ICES IIa

```

```
##      select landings      TAC shareLanding Thresh  Comments Comments2
## 1      NA      0 0.09913542      0      N 0.3265306      NA
##      Belgium      Denmark      France      Germany      Latvia
##      0.000000000      0.099135418      0.039810998      0.077349955      0.000000000
##      Lithuania      Portugal      Sweden United Kingdom
##      0.000000000      0.010163869      0.006785966      0.093284407
```

```
##Formatting
```

```
T1B <- T1A
T1B$landings <- round(T1B$landings,0)
T1B$landings[T1B$landings == 0] <- '-'
T1B$TAC <- paste(round(100*T1B$TAC,0), '%', sep='')
T1B$TAC[T1B$TAC %in% c('NA%', 'NaN%', 'Inf%')] <- '-'
T1B$shareLanding <- paste(round(100*T1B$shareLanding,0), '%', sep='')
T1B$shareLanding[T1B$shareLanding %in% c('NA%', 'NaN%', 'Inf%')] <- '-'
T1B$Thresh[T1B$landings %in% '-' & T1B$TAC %in% '-'] <- T1B$shareLanding[T1B$landings %in% '-' & T1B$TAC %in% '-']
ind <- which(T1B$Comments>.0) #Changed, so I know what the figures means
T1B$Comments <- paste(round(100*T1B$Comments,0), '%', sep='')
T1B$Comments[T1B$Comments<.25] <- '-'
T1B$Comments[T1B$Comments %in% c('NA%', 'NaN%', 'Inf%')] <- '-'
T1B$Comments[ind] <- paste('Sum of MS shares <10% = ', T1B$Comments[ind], sep='')
T1B$Comments[!ind] <- '-'
T1B$select <- '-'
T1B$select[T1B$Thresh %in% c('N')] <- 'Y'
T1B$select[T1B$Thresh %in% 'Y'] <- 'N'
T1B[T1B$RFMO %in% c('ICCAT', 'IOTC', 'WCPFC') & T1B$landings>0, c('select', 'Thresh')] <- c('Y', 'N')
T1B[T1B$spp %in% 'Anguilla anguilla' & T1B$landings>0, c('select', 'Thresh')] <- c('Y', 'N')
T1B[T1B$spp %in% 'Nephrops norvegicus' & !(grepl('TAC', T1B$area)) & T1B$landings < 0, 'TAC'] <- '-' #Changed
levels(T1B$refYears) <- c(levels(T1B$refYears), '2015')
T1B[T1B$spp %in% 'Nephrops norvegicus' & !(grepl('TAC', T1B$area)) & T1B$landings < 0, 'refYears'] <- '2015'
T1B[T1B$RFMO %in% 'GFCM', 'refYears'] <- '2015'
```

```
#Added so we can use the output to create table 1B & C
names(T1B)
```

```
## [1] "MS"      "refYears" "spp"      "region"
## [5] "RFMO"    "area"      "select"    "landings"
## [9] "TAC"     "shareLanding" "Thresh"    "Comments"
## [13] "Comments2"
```

```
names(table1A)
```

```
## [1] "region"      "sppName"      "latinName"
## [4] "RFMO"        "RFMO_Stock_ID" "FIDES_stockID"
## [7] "area"        "areaBis"      "TAC.area.description"
## [10] "Comments"    "reportingName" "latinName_old"
## [13] "FIDES_stockID_old"
```

```
T1B$Comments_comb <- ifelse(T1B$Comments != "-" & !(is.na(T1B$Comments2)), paste(T1B$Comments, T1B$Comments2),
                             ifelse(T1B$Comments == "-" & !(is.na(T1B$Comments2)), T1B$Comments2,
                                     ifelse(T1B$Comments != "-" & is.na(T1B$Comments2), T1B$Comments, ""))
```

```
T1C <- merge(select(distinct(T1B), -Comments, -Comments2), select(distinct(table1A), -Comments), by.x =
names(T1C))
```



```
## [1] "region"          "spp"              "area"
## [4] "RFMO"            "MS"               "refYears"
## [7] "select"          "landings"         "TAC"
## [10] "shareLanding"    "Thresh"           "Comments_comb"
## [13] "sppName"         "RFMO_Stock_ID"    "FIDES_stockID"
## [16] "areaBis"         "TAC.area.description" "reportingName"
## [19] "latinName_old"   "FIDES_stockID_old"

T1C <- mutate(T1C, speciesIncluded = spp, spp = reportingName, Comments = Comments_comb)
names(T1C)
```

```
## [1] "region"          "spp"              "area"
## [4] "RFMO"            "MS"               "refYears"
## [7] "select"          "landings"         "TAC"
## [10] "shareLanding"    "Thresh"           "Comments_comb"
## [13] "sppName"         "RFMO_Stock_ID"    "FIDES_stockID"
## [16] "areaBis"         "TAC.area.description" "reportingName"
## [19] "latinName_old"   "FIDES_stockID_old" "speciesIncluded"
## [22] "Comments"
```

```
T1C<-T1C[,c("MS","refYears","spp","region","RFMO","area","select","landings","TAC","shareLanding","Thresh")]
```

Export of Table 1A

the rule sum of quotas for countries <10% (less or more than 25%) is noted in the comments column

```
ind <- order(as.character(T1B$region), as.character(T1B$RFMO), as.character(T1B$spp), as.character(T1B$Comments))
write.table(T1C[ind,], file=paste(output_path, CTRY, '_table1A_filled_dnk.csv', sep=''), sep=';', row.names=FALSE)
```