BALTIC 2nd FORUM MSP

W 2/1 Catching fish and fisheries in planning (Baltic SCOPE)

VMS – a tool to illustrate a fishing activities

Maksims Kovšars

Member of ICES WG on Spatial Fisheries Data (WGSFD)

VASAB VISION & STRATEGIES AROUND THE BALTIC SEA

Baltic SCOPE Towards coherence and cross-border solutions in Baltic Maritime Spatial Plans

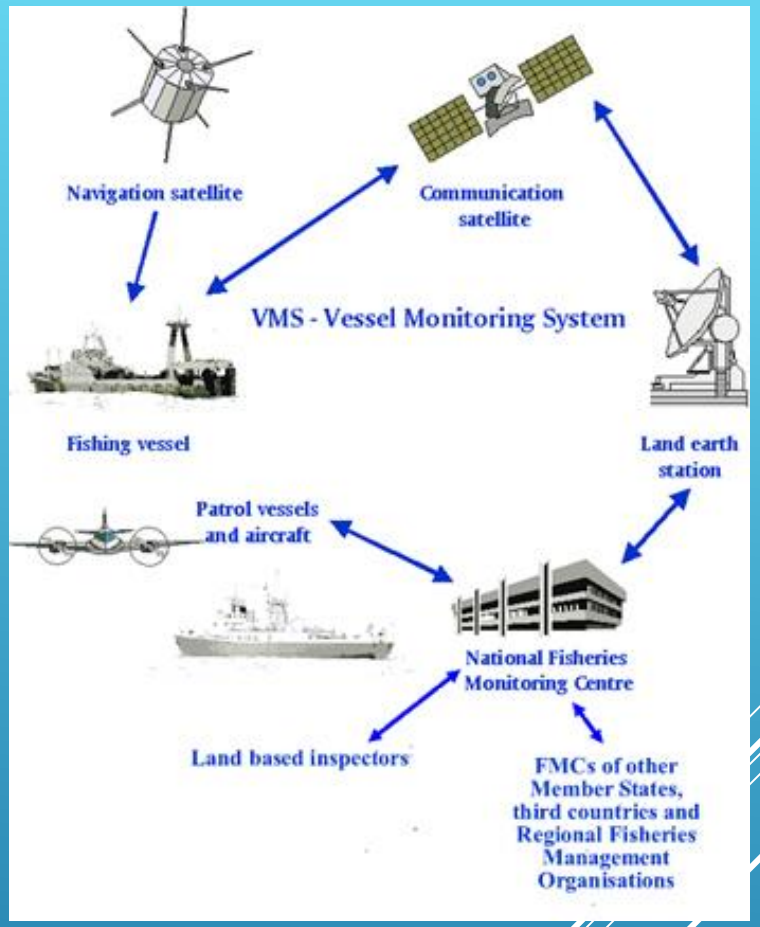
EUROPEAN UNION European Maritime and Fisheries Fund

ICES CIEM

#BalticMSP

Vessel Monitoring System (VMS)

- Compulsory for vessels above 12 m (from 1 January 2012)
- Minimum interval between signals - 2 hours
- Signal contain information about:
  - Location
  - Time
  - Course
  - Speed of vessel



CONTROL TECHNOLOGIES OF FISHERY

Electronic recording and reporting system (ERS)

- Used to record fishing activities:
  - Catches (possibility of cross-checking with VMS data)
  - Landings
  - Sales
- Replaces paper logbooks (often referred to as an “e-logbook”)

CONTROL TECHNOLOGIES OF FISHERY

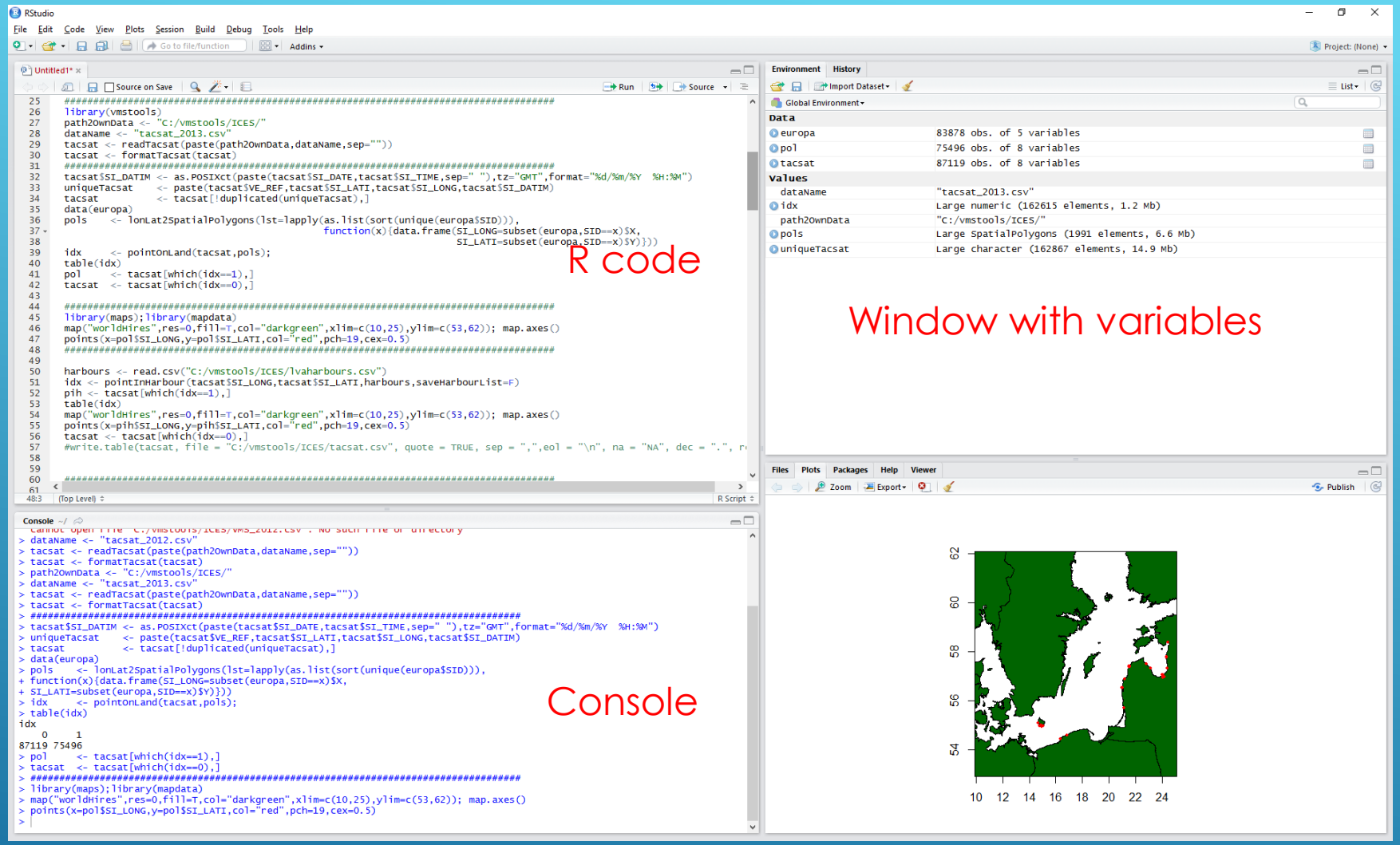
LATVIAN FLEET DESCRIPTION

- Total number of vessels – 681
- Equipped with VMS – 71 (approx., 240000 signals in 2015)
- Without VMS – 610 (operating mainly in coastal zone)
  - Without engines – 360

- Fleet register give information about:
  - Vessel length
  - Gross tonnage
  - Main engine power

HOW TO MERGE AVAILABLE INFORMATION

- Data sources
  - EFLALO dataset (combined e-logbooks and fleet register)
  - TACSAT dataset (VMS signals)
- Software
  - R – free software environment for statistical computing and graphics (https://www.r-project.org/)
  - VMStools – open-source package build in R to process, analyze and visualize logbooks and VMS data. (http://nielshintzen.github.io/vmstools/)
- Good programming knowledges


RStudio
File Edit Code View Plots Session Build Debug Tools Help
Untitled1*
Source on Save
Run
Source
25 ##
26 library(vmstools)
27 path2OwnData <- "C:/vmstools/ICES/"
28 dataName <- "tacsat_2013.csv"
29 tacsat <- readTacsat(paste(path2OwnData,dataName,sep=""))
30 tacsat <- formatTacsat(tacsat)
31 ##
32 tacsat$SI_DATIM <- as.POSIXct(paste(tacsat$SI_DATE,tacsat$SI_TIME,sep=" "),tz="GMT",format="%d/%m/%Y %H:%M")
33 uniqueTacsat <- paste(tacsat$VE_REF,tacsat$SI_LATI,tacsat$SI_LONG,tacsat$SI_DATIM)
34 tacsat <- tacsat[!duplicated(uniqueTacsat),]
35 data(europa)
36 pols <- lonLat2SpatialPolygons(lst=lapply(as.list(sort(unique(europa$SID))),
37 function(x){data.frame(SI_LONG=subset(europa,SID==x)$X,
38 SI_LATI=subset(europa,SID==x)$Y)}))
39 idx <- pointOnLand(tacsat,pols);
40 table(idx)
41 pol <- tacsat[which(idx==1),]
42 tacsat <- tacsat[which(idx==0),]
43
44 ##
45 library(maps);library(mapdata)
46 map("worldHires",res=0,fill=T,col="darkgreen",xlim=c(10,25),ylim=c(53,62)); map.axes()
47 points(x=pol$SI_LONG,y=pol$SI_LATI,col="red",pch=19,cex=0.5)
48 ##
49
50 harbours <- read.csv("C:/vmstools/ICES/lvaharbours.csv")
51 idx <- pointInHarbour(tacsat$SI_LONG,tacsat$SI_LATI,harbours,saveHarbourList=F)
52 pih <- tacsat[which(idx==1),]
53 table(idx)
54 map("worldHires",res=0,fill=T,col="darkgreen",xlim=c(10,25),ylim=c(53,62)); map.axes()
55 points(x=pih$SI_LONG,y=pih$SI_LATI,col="red",pch=19,cex=0.5)
56 tacsat <- tacsat[which(idx==0),]
57 #write.table(tacsat, file = "C:/vmstools/ICES/tacsat.csv", quote = TRUE, sep = ",",eol = "\n", na = "NA", dec = ".",
58
59
60 ##
61
48:3 (Top Level) R Script
R code
Environment History
Import Dataset
List
Global Environment
Data
europa 83878 obs. of 5 variables
pol 75496 obs. of 8 variables
tacsat 87119 obs. of 8 variables
Values
dataName "tacsat_2013.csv"
idx Large numeric (162615 elements, 1.2 Mb)
path2OwnData "C:/vmstools/ICES/"
pols Large SpatialPolygons (1991 elements, 6.6 Mb)
uniqueTacsat Large character (162867 elements, 14.9 Mb)
Window with variables
Console ~/
> dataName <- "tacsat_2012.csv"
> tacsat <- readTacsat(paste(path2OwnData,dataName,sep=""))
> tacsat <- formatTacsat(tacsat)
> path2OwnData <- "C:/vmstools/ICES/"
> dataName <- "tacsat_2013.csv"
> tacsat <- readTacsat(paste(path2OwnData,dataName,sep=""))
> tacsat <- formatTacsat(tacsat)
> ##
> tacsat$SI_DATIM <- as.POSIXct(paste(tacsat$SI_DATE,tacsat$SI_TIME,sep=" "),tz="GMT",format="%d/%m/%Y %H:%M")
> uniqueTacsat <- paste(tacsat$VE_REF,tacsat$SI_LATI,tacsat$SI_LONG,tacsat$SI_DATIM)
> tacsat <- tacsat[!duplicated(uniqueTacsat),]
> data(europa)
> pols <- lonLat2SpatialPolygons(lst=lapply(as.list(sort(unique(europa$SID))),
+ function(x){data.frame(SI_LONG=subset(europa,SID==x)$X,
+ SI_LATI=subset(europa,SID==x)$Y)}))
> idx <- pointOnLand(tacsat,pols);
> table(idx)
idx
0 1
87119 75496
> pol <- tacsat[which(idx==1),]
> tacsat <- tacsat[which(idx==0),]
> ##
> library(maps);library(mapdata)
> map("worldHires",res=0,fill=T,col="darkgreen",xlim=c(10,25),ylim=c(53,62)); map.axes()
> points(x=pol$SI_LONG,y=pol$SI_LATI,col="red",pch=19,cex=0.5)
Console
Files Plots Packages Help Viewer
Zoom Export Publish
62 60 58 56 54
10 12 14 16 18 20 22 24

HOW IT WORKS!

RecordType	VesselFlagCountry	Year	Month	C-square	LengthCat	Gear	Europeanlvl6	Fishing hour	KWhour	TotWeight	TotEuro	Av fish speed	Av vessel length	Av vessel KW
VE	Latvia	2015	2	1501:458:226:4	>15	OTB	OTB_DEF_>=105_1_110	1.90	699.20	516.42	0.00	1.34	25.45	368.00
VE	Latvia	2015	5	1501:458:219:2	>15	OTM	OTM_SPF_16_31_0_0	1.93	1848.27	292.98	0.00	1.13	33.99	956.00
VE	Latvia	2015	1	7502:374:110:3	>15	OTM	OTM_SPF_16_31_0_0	0.73	162.07	1217.95	0.00	1.03	25.45	221.00

- Data are provided in anonymized and aggregated form.
- Represented in a "c-squares“ (0.05 x 0.05 degree)
  - Tony Rees, CSIRO Marine Research Hobart, Tasmania Australia, 2003 http://www.cmar.csiro.au/csquares/csq-article-Mar03-lowres.pdf
- **This information is still sensitive!!!**

HOW IT LOOKS LIKE?

WHY WE NEED THIS DATA?

- To evaluate the spatial and temporal effects of fishing
- Map the location of habitats sensitive to particular fishing activities(i.e. Vulnerable Marine Ecosystems, VMEs)
- Map the aggregated distribution of fishing by different gear types
- Calculation of the EU Data Collection Framework (DCF) indicators:
  - DCF Indicator 5: Distribution of fishing activities
  - DCF Indicator 6: Aggregation of fishing activities
  - DCF Indicator 7: Areas not impacted by mobile bottom gears

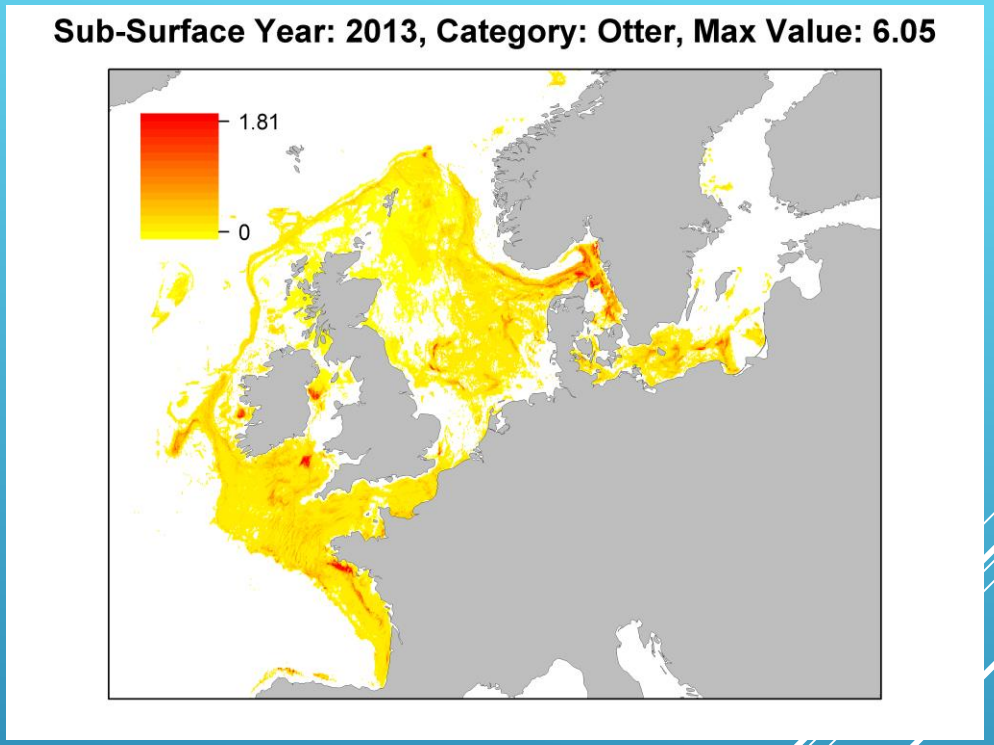
WHY THIS DATA IS NEEDED INTERNATIONALLY?

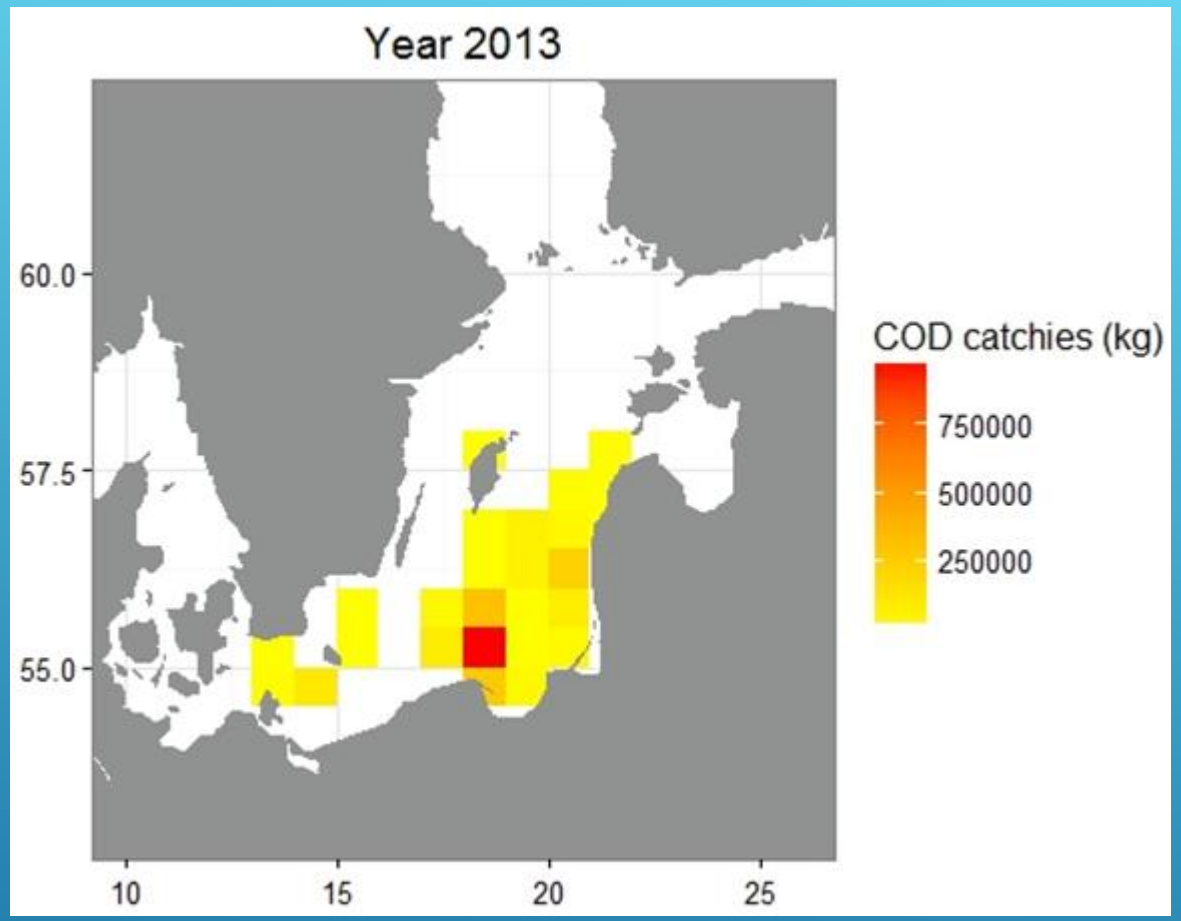
- Response on ICES data call: VMS/Log book data 2009 to 2015
  - For WGSFD analysis spatial fisheries data in order to evaluate fishing effort, intensity, and frequency in European waters
  - For ICES advice about indices for DCF indicators 5, 6, and 7

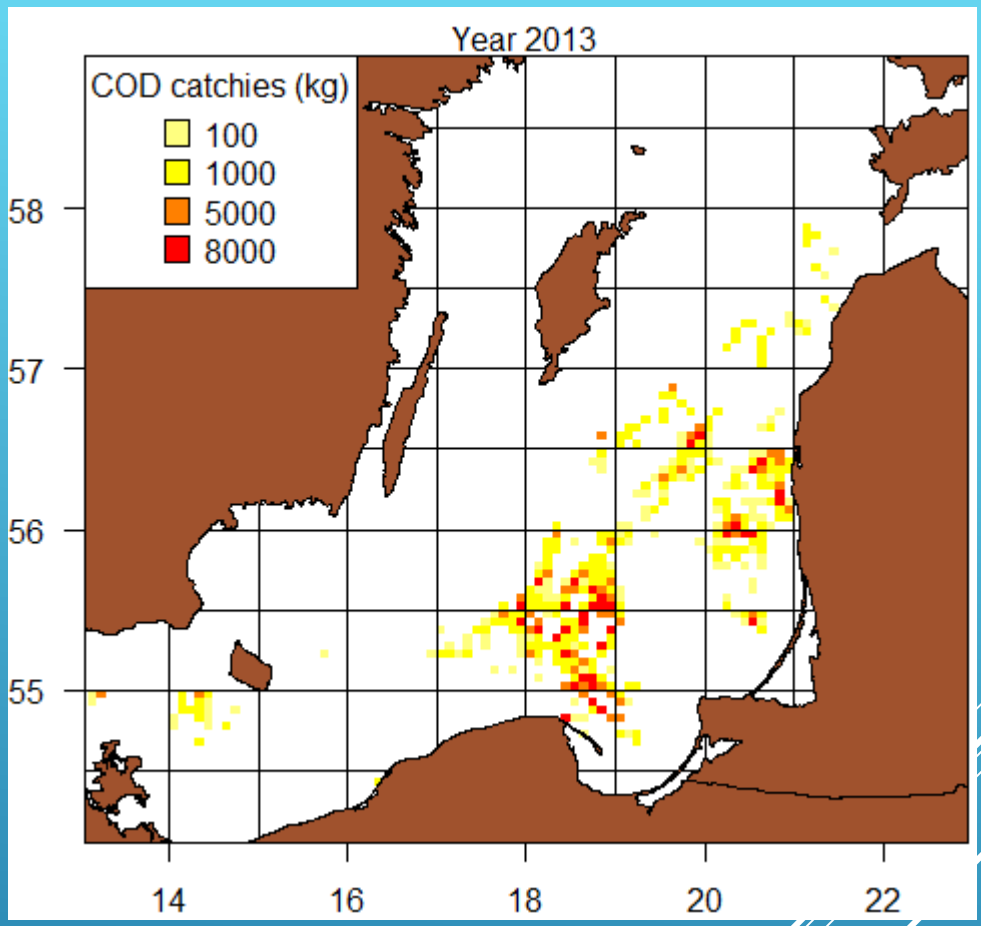
- ICES - the International Council for the Exploration of the Sea (http://ices.dk)

WHAT'S DOING WGSFD?

- In past (since 2012):
  - defined standards for VMS and logbook data
  - data compilation, quality control and harmonization
- At present:
  - Provides advice for other groups (WGDEC ...)
  - answering different requests (OSPAR, HELCOM)
- In the future:
  - develop further methods and indices
  - Investigation of interaction between fishing activities and the ecosystem.







ICES RECTANGLES VS C-SQUARES

0.5˚ X 1˚ VS 0.05˚ X 0.05˚

Thanks for your attention!