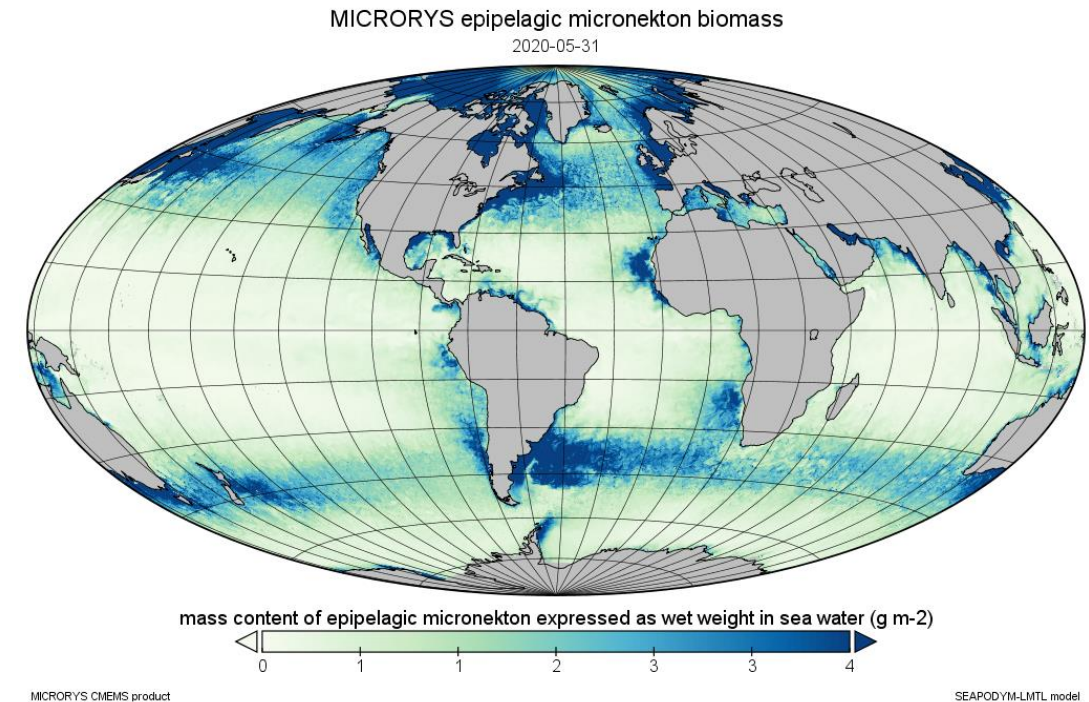
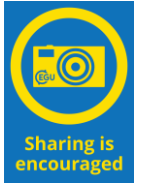


Zooplankton and Micronekton products from the CMEMS Catalogue

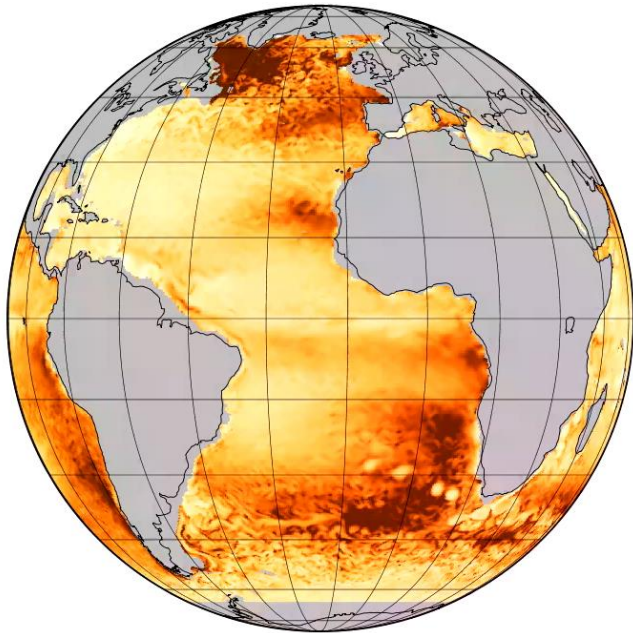
State of the current product and development plan

Olivier Titaud¹, Anna Conchon¹, Patrick Lehodey^{2,3}

1. Collecte Localisation Satellites
2. Mercator Ocean International
3. Pacific Community



Ocean Low & Mid-Trophic Levels



SPC 2019
Credit: Elodie Vourey

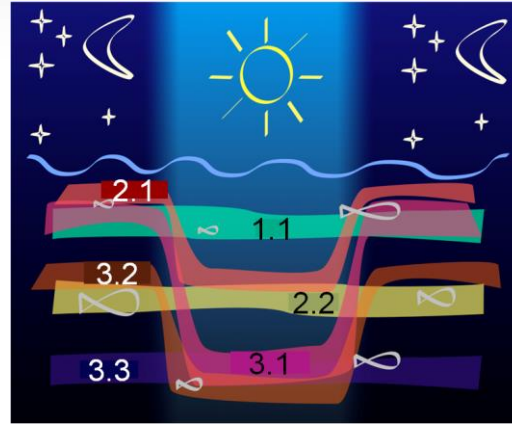
A very large diversity of species in the ocean constitute the low (zooplankton) and mid-trophic (micronekton) levels of the food web. They are the prey of larger size animals.

Micronekton (~1-20 cm), including larvae and juveniles of large fish species, feed on zooplankton, as some other very large animals (whale shark or baleen whales)

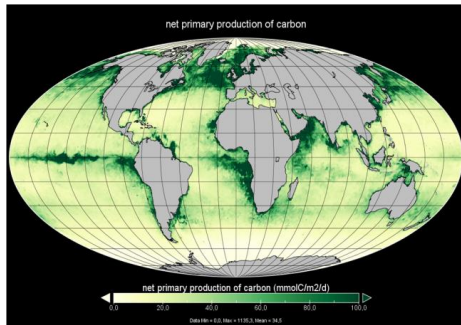
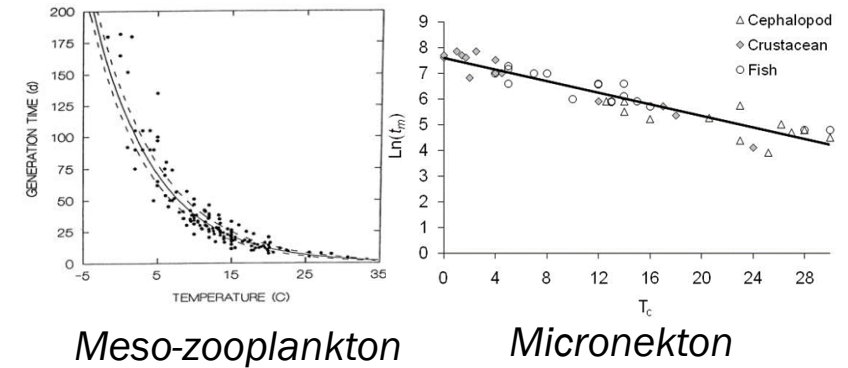
Large fish, cephalopods, seabirds and many marine mammals feed on micronekton

The Spatial Ecosystem And POpulation DYnamic Model (SEAPOODYM)

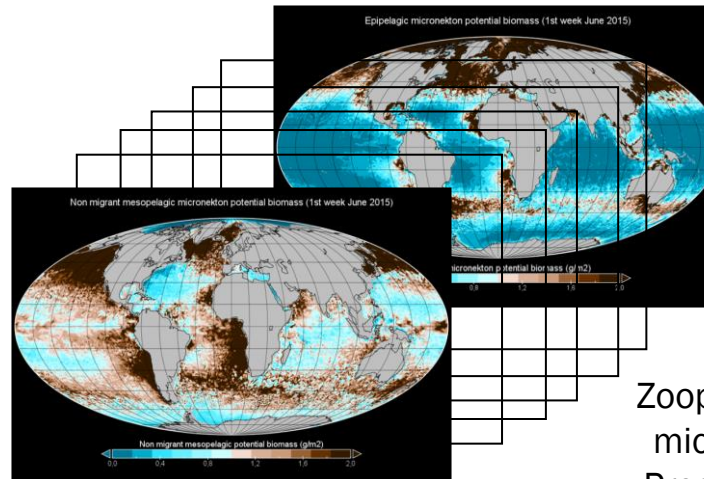
Using temperature, oceanic currents and Net Primary Productivity, SEAPOODYM - LMTL simulates spatio-temporal dynamics of one zooplankton and 6 micronekton functional groups, according to their diel vertical migration behavior in 3 vertical layers (epi-, upper meso- and lower meso-pelagic)



Time of development until maturity vs temperature



part of NPP



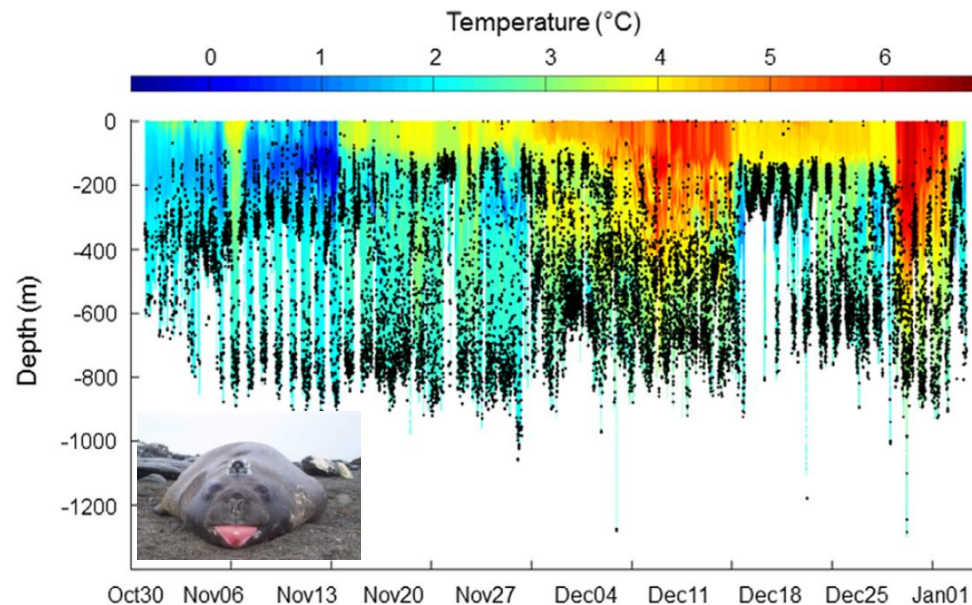
Zooplankton & micronekton Productivity & biomass

A parsimonious approach (11 parameters)

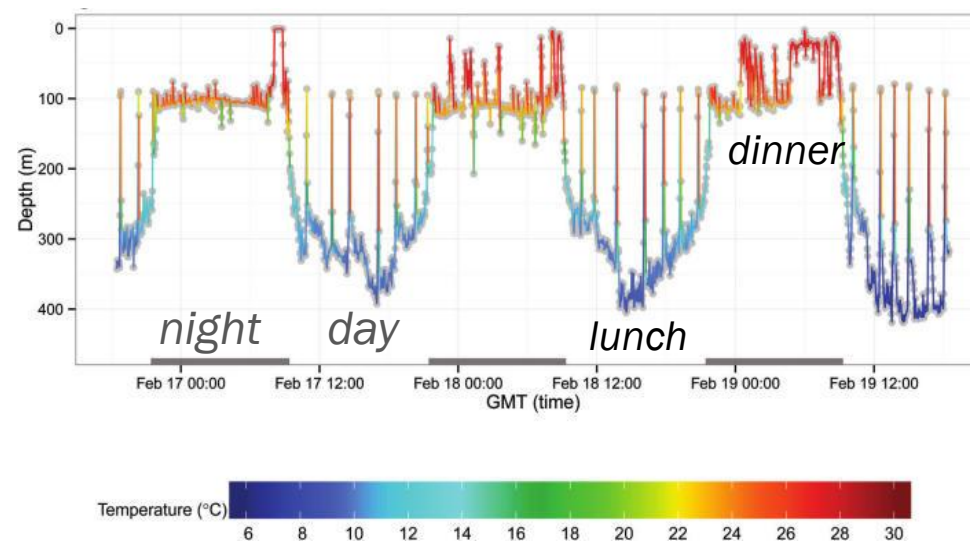
Lehodey et al. 1998; *Fish. Oceanog.*; 2010, *Progr. Oceanog.*; 2015, *ICES J Mar Sci*; CMEMS: QUID document

Provide two essential ecosystem variables **zooplankton** and **micronekton** for better modelling of habitats and dynamics of key marine species

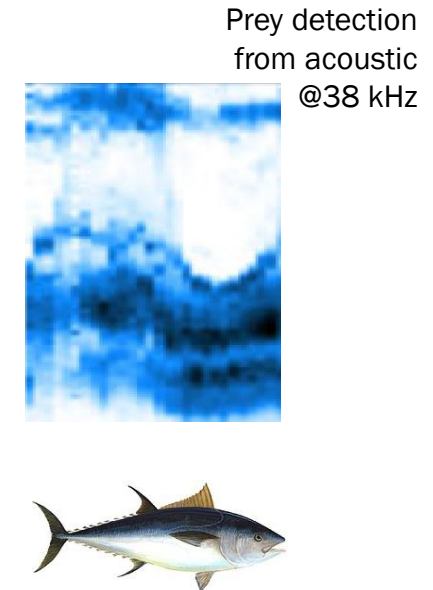
Behaviour and distributions of large oceanic species are linked to the distribution of their prey



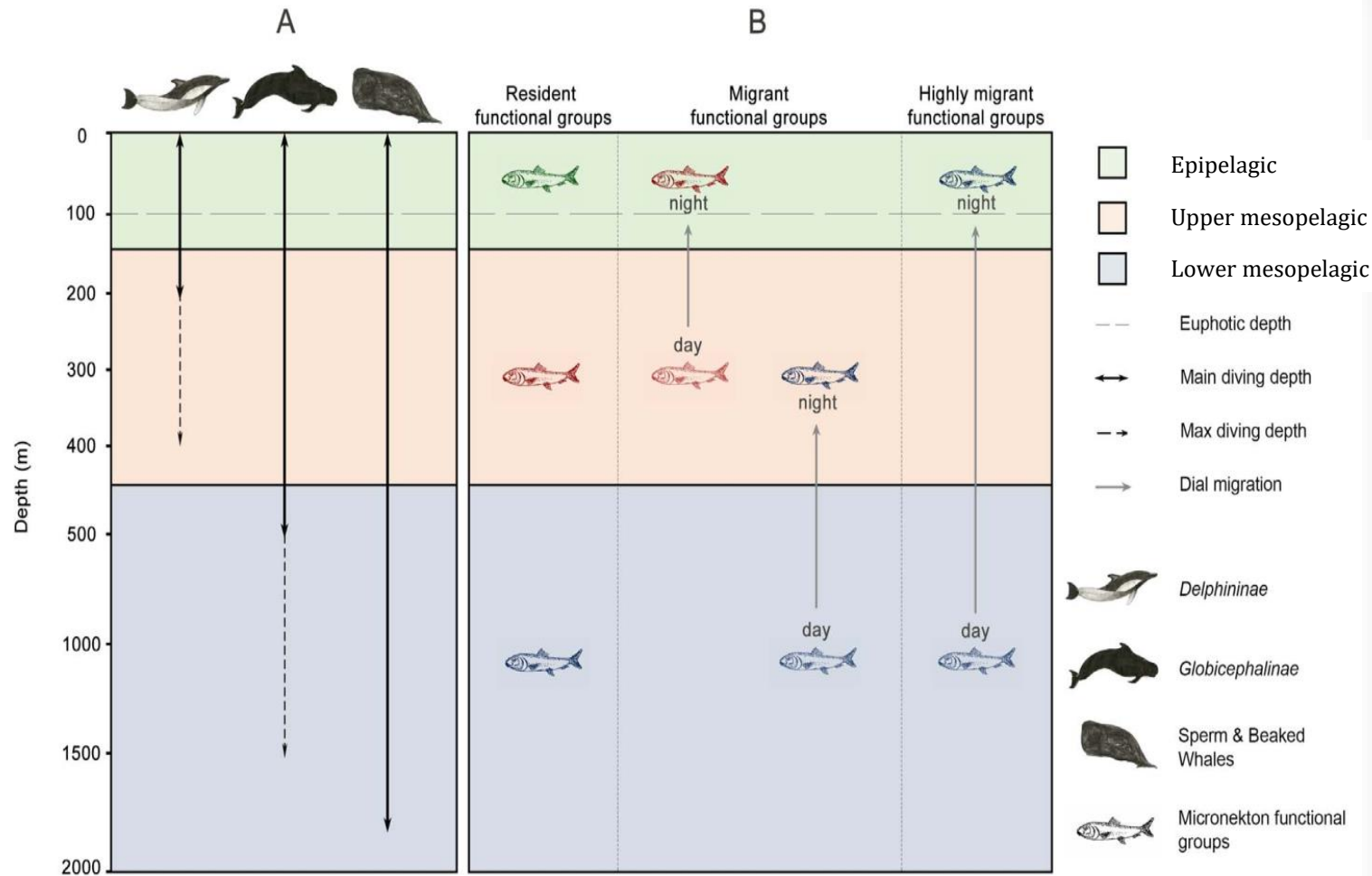
Temperature profiles obtained for a two-month foraging trip of one Elephant Seal. Each black dot corresponds to a prey capture attempt (Vacquié-Garcia et al. 2015).



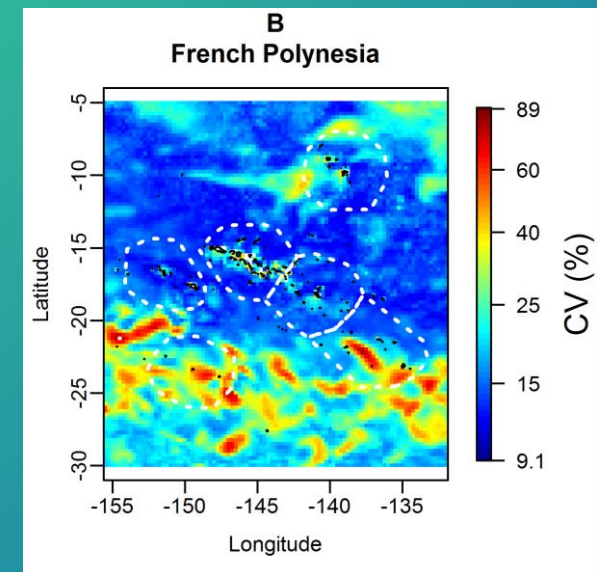
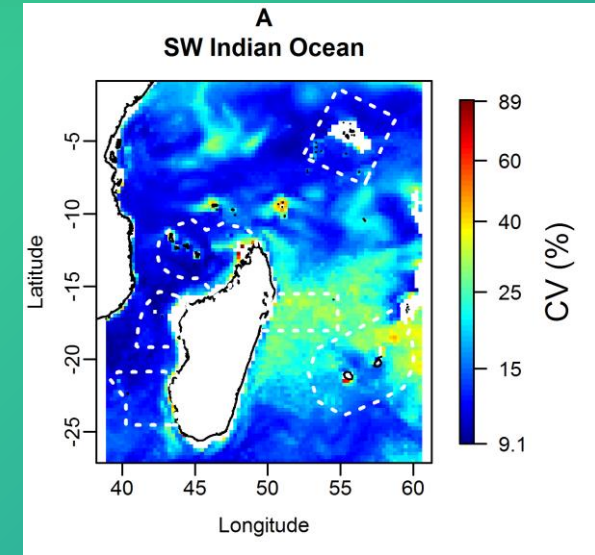
Time series of depth and temperature for one bigeye tuna tagged in the N-W Atlantic (C. H. Lam et al. 2014)



Vertical repartition of cetaceans and preys in the water column



Lambert et al. 2014



The MICRORYS CMEMS product (reanalysis) with CMEMS forcings

Forcing variable	“Dependencies”	CMEMS Product
Physics (T,U,V)		CMEMS GLOBAL_REANALYSIS_PHY_001_030
Physics (T,U,V)		CMEMS GLOBAL_REANALYSIS_PHY_001_030
Observed NPP	Chla	CMEMS OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082
	SST	NOAA NCEI AVHRR
	SSRD (*)	ERA-INTERIM reanalysis (ECMWF)
Observed Zeu	Chla (**)	CMEMS OCEANCOLOUR_GLO_CHL_L4_REP_OBSERVATIONS_009_082
Simulated NPP		CMEMS GLOBAL_REANALYSIS_BIO_001_029
Simulated Zeu	Chla (**)	CMEMS GLOBAL_REANALYSIS_BIO_001_029

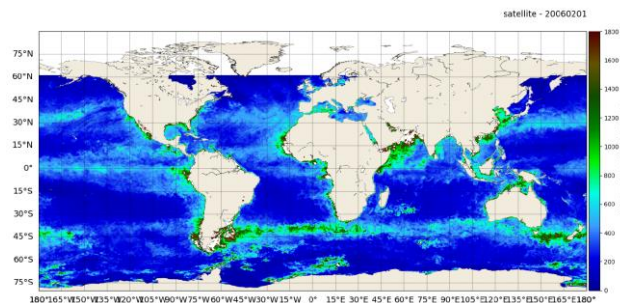
(*) Surface Solar Radiation Downwards

(**) Morel's Case I model

When missing observations

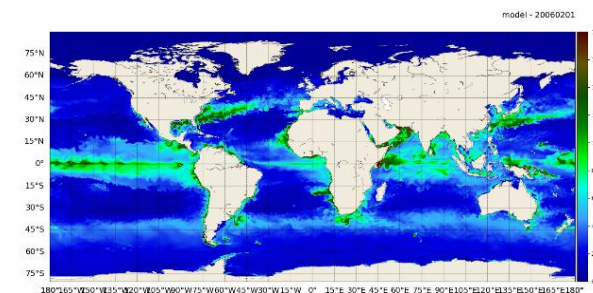
When missing observations

Observed NPP: VGPM algorithm from satellite-based Chlorophyll a



Observed NPP

Missing data are compensated with model (ex. boreal winter)



Simulated NPP

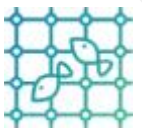
MICRORYS development plan



Better transport estimation specially at high latitudes



New estimation of pelagic layer depth
(currently under investigation using machine learning ?)



Improve parametrisation



WE NEED MORE DATA !





MICRORYS

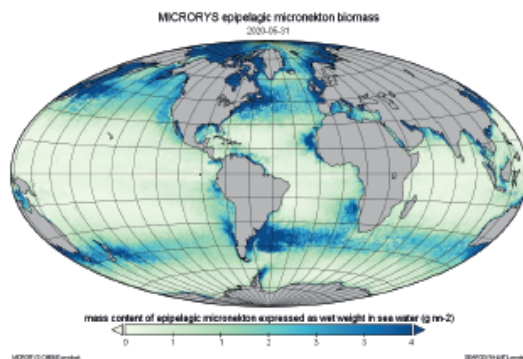
Zooplankton and micronekton reanalysis,
a daily 1/12° CMEMS product

MICRORYS is produced at **Collecte Localisation Satellite (CLS)**
for **Copernicus Marine Environment Monitoring Service**.

It is proposed for end users involved in marine resources and ocean
ecosystem management and conservation. It is based on the Low
and mid-trophic level module of the **Spatial Ecosystem And
Population Dynamics Model (SEAPODYM)**.

It contains time series of meso-zooplankton and 6 functional
groups of micronekton biomass.

It can be downloaded from the **CMEMS** portfolio :



resources.marine.copernicus.eu/product-detail/GLOBAL_MULTIYEAR_BGC_001_033



Our team at CLS and Mercator



Dr Anna
Conchon
Ecosystem
modelling
Team leader



Dr Olivier
Titaud
Numerical computing
Operational systems



Dr Laurène
Merillet
Ecosystem



Sarah
Albernh
PhD student
Carbon budget



Dr Guillaume
Briand
Physics



Dr Patrick
Lehodey
HdR
Author of
SEAPODYM model
Marine Biology
Fisheries



seapodym-contact@groupcls.com



www.seapodym.eu

