

ASCOBANS Resource Depletion WG



- Established by recommendation from AC24
- Submitted Interim Report in 2020 (MOP9/[Doc.6.2.4](#))
- Submitted Final Report recently

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Terms of Reference

- A. **Review/summarise recent information** on resource depletion and its impacts on small cetaceans and **identify additional research needed**.
- B. Review sources of information on ***prey distribution and abundance*** (e.g., fishery landings and effort data, stock assessments, fish surveys) ...
- C. Liaise with other ASCOBANS initiatives to develop ***health/condition indicators*** for small cetaceans, based on information from live animals and/or necropsies...
- D. Review and collate information on ***diet of small cetaceans*** in the ASCOBANS area ... to improve understanding of likely responses to changes in prey availability...

Terms of Reference

E. Review spatio-temporal trends in ***sightings data on distribution and abundance*** of small cetaceans, in relation to possible relationships with trends in ... their known prey.

F. Review relevant information from ***emerging technologies*** (e.g. drones to determine condition; eDNA to estimate fish presence in association with actively feeding cetaceans) ...

G. Explore prospects for ***integrating information from multiple data sources*** to provide inter/multidisciplinary insights into the resource depletion issue.

H. Recommend possible ***mitigation measures***; explore options for better integrating cetacean conservation measures (e.g. MPAs, time-area closures).

ToR A: Review/summarise recent information on resource depletion and its impacts on small cetaceans; identify research needs

- **Define** prey depletion: it relates to prey abundance, availability, and quality (energy content); it can occur at different scales
- **Causes:** fishing, habitat degradation, disturbance (of predator or prey), etc.
- **Impacts:** individual condition, health, fecundity, survival, population abundance; some prey species are more important than others
- **Vulnerability** may relate to: health or reproductive status, metabolic rate, degree of dietary specialization
- **Research/monitoring:** Cetacean condition, health, diet (from strandings, photogrammetry); ecological models; prey and predator distribution and abundance
- **Recommendations:** focus mitigation of prey depletion on those prey species whose decline would have the highest potential impact on small cetaceans

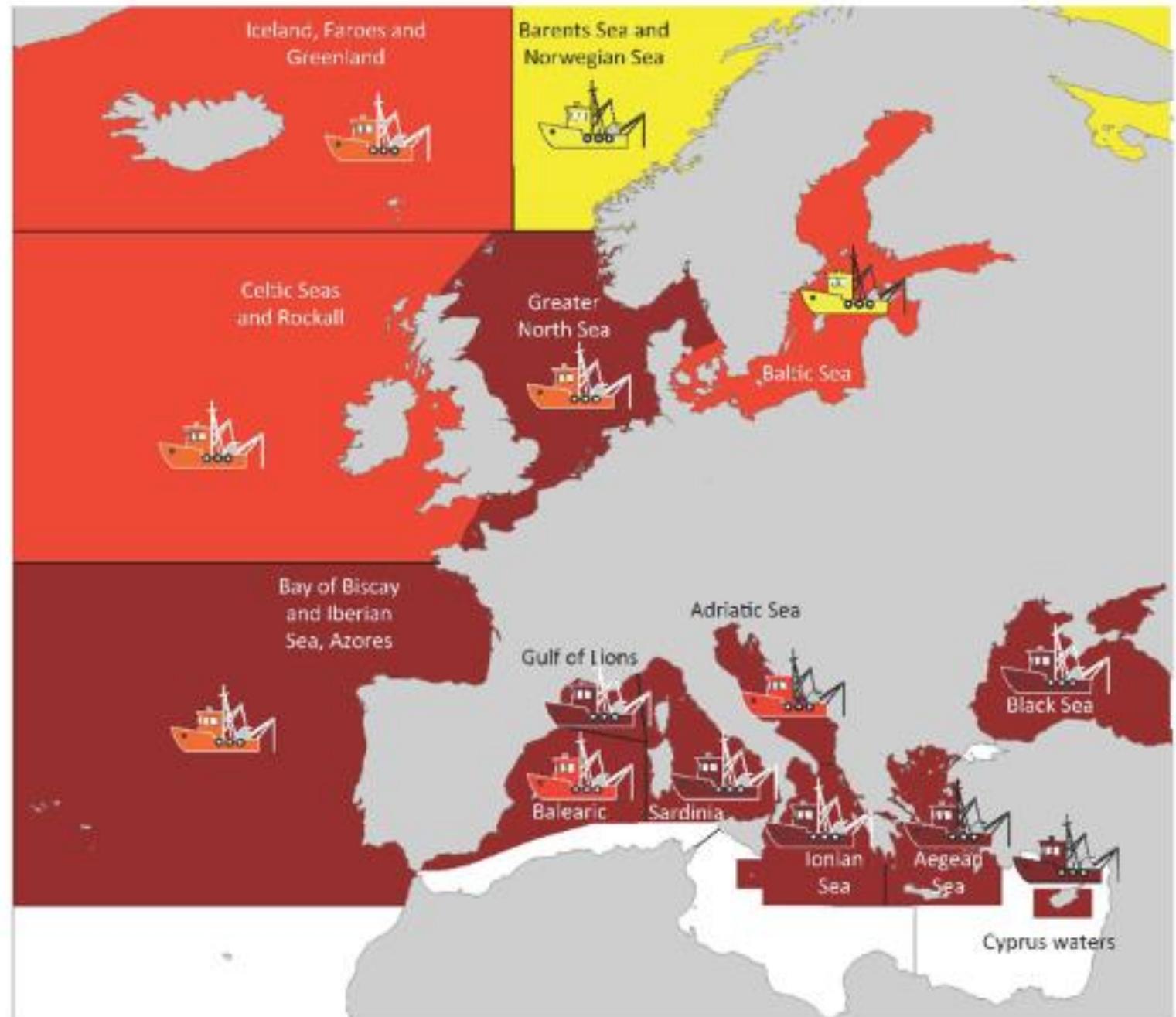
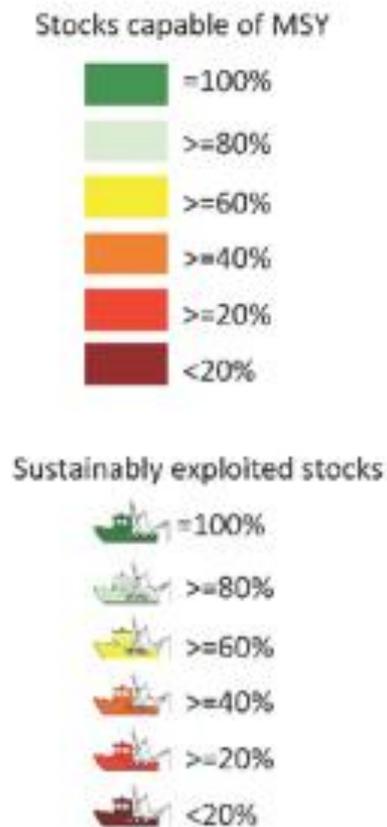
TOR B. Review sources of information on **prey distribution and abundance**... and, if appropriate, propose a mechanism to collate relevant data, focused on species already identified as of importance in the diet of small cetaceans.

TOR E. Review spatio-temporal trends in sightings data on **distribution and abundance of small cetaceans**, in relation to possible relationships with trends in distribution and abundance of their known prey.

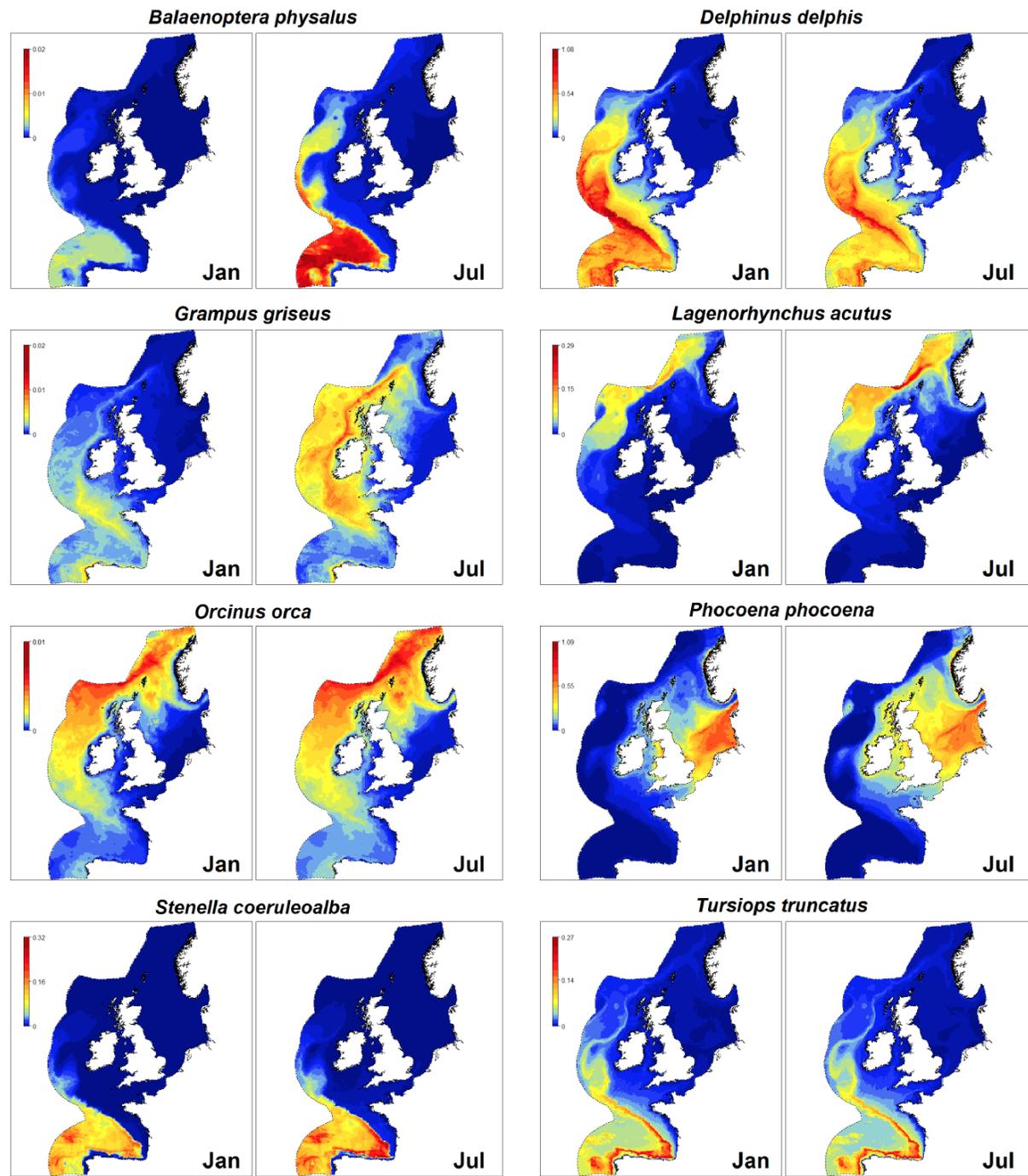
- For prey species, survey data are more useful than landings (but still mainly available only for commercial species)
- Many European fish and invertebrate stocks are overexploited.
- Cetacean distribution and abundance information available from large-scale dedicated surveys and other surveys
- Information of both is needed at similar scale and resolution... And in 4-d
- Porpoises are not necessarily found where most prey are found!
- **Research:** is needed to improved methods to relate small cetacean and prey distribution and abundance in a meaningful way
- **Recommendation:** collate annual abundance and distribution information for key prey species, in consultation with ICES and national institutes

Froese et al. 2016
Exploitation and Status
of European Stocks

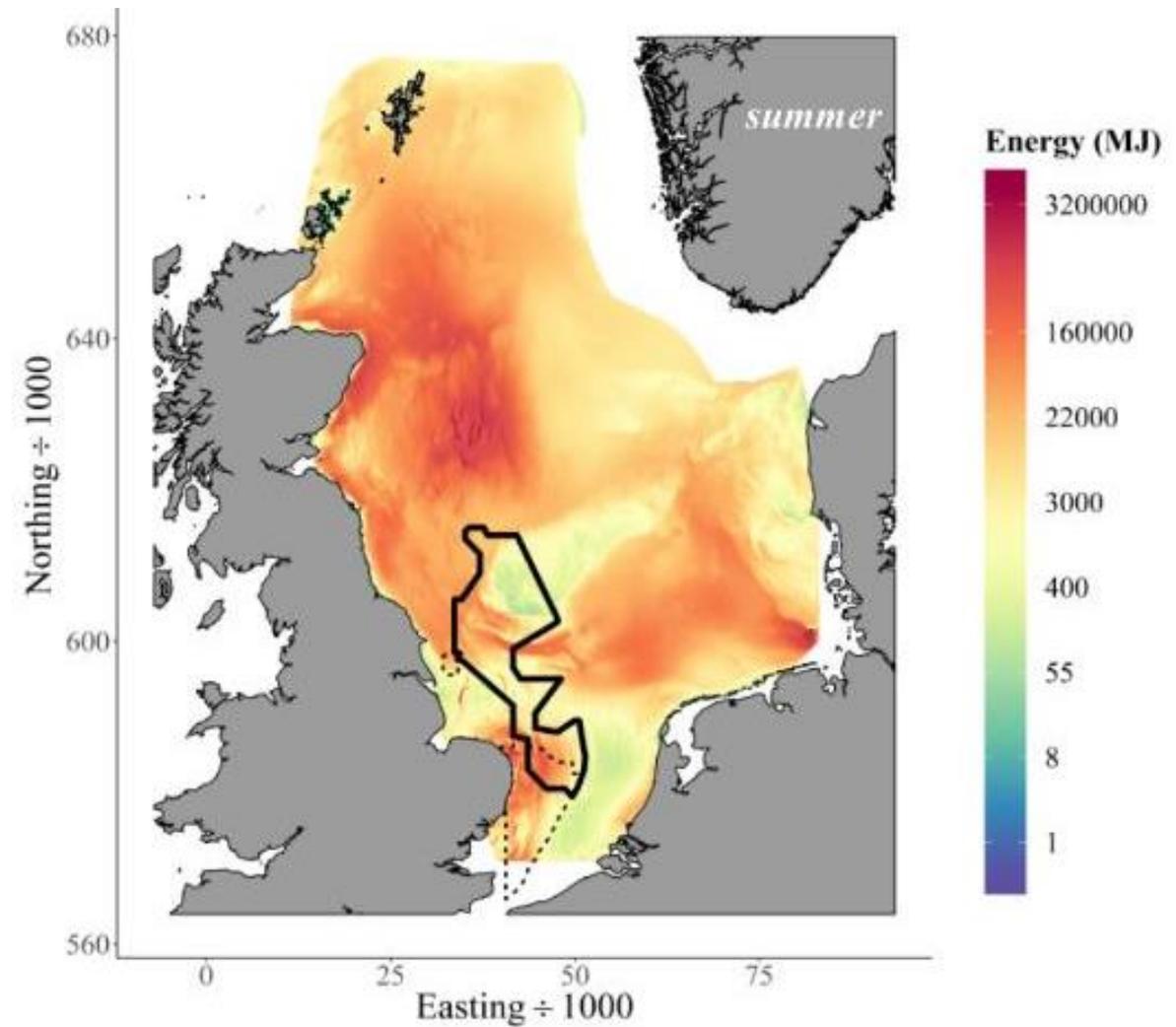
<http://oceanrep.geomar.de/34476/>



Region	Ecoregion	Species	Stock ID	Last Year	Last Catch (t)	F/F _{msy}	B/B _{msy}
NEA	Baltic Sea	<i>Clupea harengus</i>	her-2532-gor	2015	174,433	0.82	0.96
NEA	Baltic Sea	<i>Clupea harengus</i>	her-30	2015	110,415	1.05	1.56
NEA	Baltic Sea	<i>Clupea harengus</i>	her-31	2015	4,527	0.96	0.7
NEA	Baltic Sea	<i>Clupea harengus</i>	her-3a22	2015	37,491	0.63	0.48
NEA	Baltic Sea	<i>Clupea harengus</i>	her-riga	2015	32,851	1.14	0.93
NEA	Baltic Sea	<i>Gadus morhua</i>	cod-2224	2015	11,982	1.67	0.26
NEA	Baltic Sea	<i>Gadus morhua</i>	cod-2532	2015	43,670	2.43	0.28
NEA	Baltic Sea	<i>Sprattus sprattus</i>	spr-2232	2015	247,000	1.29	0.66
NEA	BoB & Iberian coast	<i>Sardina pilchardus</i>	sar-78	2014	45,312	1.08	1.16
NEA	BoB & Iberian coast	<i>Sardina pilchardus</i>	sar-soth	2015	21,000	1.03	0.28
NEA	BoB & Iberian coast	<i>Trachurus picturatus</i>	jaa-10	2015	1,136	0.8	0.52
NEA	BoB & Iberian coast	<i>Trachurus trachurus</i>	hom-soth	2015	32,723	0.78	1.37
NEA	Celtic Seas	<i>Clupea harengus</i>	her-67bc	2015	19,885	0.36	0.59
NEA	Celtic Seas	<i>Clupea harengus</i>	her-irls	2015	18,355	0.65	1.18
NEA	Celtic Seas	<i>Clupea harengus</i>	her-nirs	2015	4,869	0.63	0.62
NEA	Greater North Sea	<i>Ammodytes tobianus</i>	san-ns1	2015	162,054	1.34	0.4
NEA	Greater North Sea	<i>Ammodytes tobianus</i>	san-ns3	2015	118,541	0.51	0.72
NEA	Greater North Sea	<i>Ammodytes tobianus</i>	san-ns4	2015	4,384	3.5	0.09
NEA	Greater North Sea	<i>Ammodytes tobianus</i>	san-ns6	2015	229	0.6	0.28
NEA	Greater North Sea	<i>Ammodytes tobianus</i>	san-ns7	2015	0	0	0.12
NEA	Greater North Sea	<i>Clupea harengus</i>	her-47d3	2015	494,099	0.43	1.58
NEA	Greater North Sea	<i>Gadus morhua</i>	cod-347d	2015	52,313	0.3	0.64
NEA	Greater North Sea	<i>Gadus morhua</i>	cod-kat	2015	508	0.12	0.39
NEA	Greater North Sea	<i>Melanogrammus aeglefinus</i>	had-346a	2014	46,320	2.11	0.21
NEA	Greater North Sea	<i>Sprattus sprattus</i>	spr-kask	2015	13,276	9.14	0.1
NEA	Greater North Sea	<i>Sprattus sprattus</i>	spr-nsea	2015	290,380	0.75	1.15
NEA	Greater North Sea	<i>Trachurus trachurus</i>	hom-nsea	2014	13,388	2.78	0.29
NEA	Wide ranging	<i>Scomber scombrus</i>	mac-nea	2014	1,394,454	1.7	1.12



Porpoise prey (energy) and the porpoise SAC (2016)



Waggitt et al (2020)

Ransijn et al (2019)

ToR C. Liaise with other ASCOBANS initiatives (and HELCOM) to develop **health/condition indicators** for small cetaceans... for identifying impacts of prey depletion and other cumulative stressors... considering that simple indicators... are influenced by multiple factors

- Assessing prey depletion and its impact requires multiple data sources... to confirm that prey stocks are depleted, and, when assessing impact, to account for effects of other stressors, reproductive status, natural fasting, etc...
- Assessing possible impacts on cetacean life history parameters requires (e.g. strandings) data from multiple years. Such work may not have a sentinel value (it takes too long to accumulate the evidence) but is very valuable
- **Further work** is needed on appropriate body condition indices
- **Recommendation:** ensure that information on health, condition, age and reproductive status is collected for stranded and bycaught cetaceans, preferably under baseline funding for monitoring

ToR D. Review and collate information on **diet of small cetaceans** in the *ASCOBANS* area (including long-term dietary variation) and foraging behaviour, to improve understanding of likely responses to changes in prey availability; identify knowledge gaps and encourage new research and monitoring of diet...

- Diet is related to morphology (skull, dentition), physiology (energy requirements) and habitat (coastal or oceanic)
- Understanding dietary selectivity requires information on prey abundance
- Diet can be determined by stomach (and intestine) contents analysis, based on identifying prey hard remains, proteins or DNA or on analysis of tissue stable isotope or fatty acid composition, and possibly contaminant profiles
- **Research:** funding is needed to work up collected samples and datasets
- **Recommendation:** bring diet analysis under baseline funding for strandings and bycatch monitoring, adopt a standardised protocol

Main prey species of small cetaceans in the ASCOBANS area

Species	Foraging habitat	Prey species commonly taken
Harbour porpoise	Mainly benthic	Whiting, sandeel, sprat, herring, cod, gobies, pouts
Bottlenose dolphin	Meso- and benthopelagic	Sea bass, salmon, whiting, cod, herring, sandeel, sprat, saithe, haddock, pouts, hake, scad, mullets
Common dolphin	Pelagic	Mackerel, pouts, sardine, anchovy, whiting, scad, sprat, sandeel, blue whiting
Risso's dolphin	Mainly benthic	Octopus, cuttlefish, various small squids
Striped dolphin	Meso- and benthopelagic	Sprat, blue whiting, whiting, silvery pout, pouts, hake, scad, anchovy, bogue, garfish, haddock, saithe, myctophids, gobies, squids
Atlantic white-sided dolphin	Pelagic	Herring, mackerel, silvery pout, blue whiting, scad, argentine, myctophids, squids
White-beaked dolphin	Pelagic	Cod, whiting, herring, mackerel, hake, scad, sprat, pouts, sandeel, haddock, sole, gobies, octopus
Killer whale	Pelagic	Mackerel, herring, salmon, cod, halibut, other marine mammals

ToR F. Review relevant information from *emerging technologies*

Relevant technological developments include

- Sonar to inform on prey biomass and behaviour and foraging of cetaceans
- ROVs, AUVs, UAVs
- Miniaturization of sensors, improved biologging tags
- eDNA, metabarcoding
- Hormone and gene expression assays for health of living animals

ToR G. Explore prospects for integrating information from multiple data sources to provide inter/multidisciplinary insights into the resource depletion issue

Multiple data sources are relevant when interpreting apparent evidence of impacts of prey depletion on cetacean individuals and populations, e.g.

- Unusual mortality events of cetaceans
- Health and condition of cetaceans
- Individual life history and population growth parameters for cetaceans
- Diet composition of cetaceans
- Cetacean and prey distribution and abundance
- Prey size and energy density
- Evidence of ecosystem impacts of fishing (and other human activities) e.g. (observed) habitat damage, (observed or modelled) effects on ecosystem functioning

ASCOBANS already receives national reports about resource depletion (as we have heard)

ToR H. Mitigation of pressures affecting cetacean prey availability - fisheries

- For many commercially fished prey species in the ASCOBANS area, a range of fishery management measures is already in place
- Fishing on certain species, e.g. cephalopods is not specifically regulated under the CFP
- **Research** on the status of important non-commercial prey species may be needed
- **Recommendations:**
 - Report on stock status (e.g. based on ICES Advice) for key prey species annually
 - Validate apparent prey depletion by reference to other information sources
 - If depletion is impacting cetaceans, seek improved fishery management measures

Take home messages

- Small cetaceans feed mainly on fish and cephalopods. Some stocks in the ASCOBANS area are overfished or have been overfished in the past
- It is difficult to prove cause and effect, e.g. poor nutritional state can be the cause or consequence of underlying disease; additional supporting information is needed
- It is likely that prey depletion is negatively affecting cetacean population status (or has done in the past), especially for the smallest species in areas where fish stocks are most depleted
- Various research needs and possible additions to routine reporting to ASCOBANS have been identified
- An update of the report (with Executive Summary) will be available