Millennium Assessment category	Specific type of ecosystem service	Components/ Pressures	Relevant descriptors
Provisioning services	Fish and shellfish	Fish and Cephalopods	3
	Aquaculture		
	Biofuels		
	Medicines		
Cultural and Recreational	Tourism, Nature watching, Recreation,		
Services	Sport	Marine Mammals	1, 3, 4, 5, 8,10 (Impacts of D2 and D11 are indirectly captured
	Knowledge	Fish and Cephalopods	through these descriptots)
	Aesthetic benefits / Inspiration	Sea birds	
	Spiritual / Cultural wellbeing	Intertidal sediment habitats	
		Intertidal rocky habitats	
		Litter (i.e. Litter on beaches affect aesthetic services)	
		Organic enrichment	
		Contamination	
Regulating services	Climate Regulation	Intertidal sediment habitats	1, 6 (Impacts of D2 should be picked up when
	Detoxification and purification (regulation		assessing the
	of water quality and air quality)	Intertidal rocky habitats	degrdadation for 1and 6)
	Hazard protection (e.g. flood and eroison control)	Benthic habitats	
	Regulation of disease and pest	Dentine habitats	
Supporting services	Photosynthesis	These are intermediate services that support the final ecosystem services (from which we benefit) and hence not valued.	
	Nutrient cycling		

Component/Pressure (policy good)	Measurable sub-category	Assessment under CP2	Predicted status under BAU 2020	GES Target	Difference between preferred GES target and BAU in units from Table 1
Intertidal sediments Recreation on beaches; Natural hazard protection – including		Along the south-eastern and north-western coasts of England and parts of Wales, intertidal sediments form extensive beaches, sandbanks, saltmarshes and muddy shorelines. In Scotland and Northern Ireland, such stretches of intertidal sediments are	and saline reedbeds; intertidal sediments dominated by	Predominant habitat types - No target proposed – see qualitative target below for 1.6 All listed (special) & predominant habitat types - Range and distribution is stable or increasing and not smaller than the	GES is probably achieved under the Business As Usual Scenario. This suggests there is no degradation (apart from on a small scale at a
species that provide hazard protection (e.g. saltmarsh); Regulating services; Provisioning services (commercial crops such as cockles, oyster/mussel farms)		often interspersed with nocky promontories and headlands. Human pressures have adversely affected moderate to large areas of these habitats, notably mudflats and saltmarshes, in most of the UK seas apart from those around northern and western Scotland. Historical land claim and the construction of coastal defences and other structures have caused widespread habitat loss, particularly in England. Such structures also affect these habitats by changing current patterns and sediment distribution. In the Southern North Sea and Eastern Channel, the presence of invasive non-native species	aquatic angiosperms. For all these habitats there ould be a very slight increase in impact from emergence regime changes (hydrological changes to emergence regimes from new tidal barrages, costald defences or managed realignment), and for littoral sand and muddy sand there could be a very slight increase in pressure from physical change (e.g. changes to physical).	stable or increasing and not smaller than the baseline value Directive habitats) ([Favourable Reference Range for Habitats Directive habitats)	local level).
		Southern worm Sea ain Lastern Channer, the presence or invasive non-native species such as common cordgrass (Sparina anglica) has led to widespread changes to saltmarshes and mudflats. Water quality can affect these habitats and although water quality has improved overall, there are still some small inshore areas where hazardous substances and nutrient enrichment are a problem. Beach litter levels are high in most regions but impacts remain largely unknown. There are also specific local scale issues f specific intertidal sediments.	substrates from the footprint of development). But for all these habitats the area of impact from these pressures amounts to between 0.01% and 0.5% of the habitat. However – assessments for littoral habitats are likely to be low in confidence due to poorly resolved habitat information. In particular, habitats such as intertidal	- All Listed (special) habitat types: o Area is stable or increasing and not smaller than the baseline value (Favourable Reference Area for Habitats Directive habitats) o Area is stable or increasing and not smaller than the baseline value (Favourable Reference Area for Habitats Directive habitats) o Area is stable or increasing and not smaller than the baseline value (Favourable Reference Area for Habitats Directive habitats ow WPD extent targets for saltmarsh and seagrass should be used within WFD boundaries as appropriate. All Listed (special) habitat types: o Area is stable or increasing and not smaller than the baseline value (Favourable Reference Area for Habitats Directive habitats) within WFD boundaries as appropriate.	ts) ed
				1.6 Habitat Condition and 6.1 Physical damage Predominant habitat pase — Improve the condition of benthic sediment habitats, taking action to reduce impacts there these have been identified as unacceptable. All Listed (special) habitat types: O Area of habitat below GES (i.e. unacceptable impact / unsustainable use) as defined by condition indicators must unsustainable use) as defined by condition indicators must unsustainable use) as defined by condition indicators must not exceed 5% of baseline value (favourable reference area dexceed 5% of baseline value (favourable reference area for HD habitats) O WFD targets (km² thresholds) for area of unacceptable impact / unsuder the product of the product	t.
Intertidal rocky habitats Recreation; Natural hazard		Intertidal rocky habitats, including rocky and boulder shores and sea cliffs, occur in all Uk seas. These habitats are generally in good condition. The harvesting of edible shellfish is	High energy littoral rock; moderate energy littoral rock;	January Landronate 1.4 - habitat distribution - • All listed (special) and predominant habitat types - Range and distribution are	GES is probably achieved under the Business As Usual Scenario. This suggests there is no
protection; Provisioning services (crops such as seaweeds for alginates, fertilisers, medicines, food). This habitat is highly		seas. In reser relations are generally in good colloution. The relaveshing or eclinic shellins in affecting some local rocky shore biological communities in the Greater North Sea sub-Region and the south-west parts and the Irish Sea in the Celtic Seas sub-Region. Non-native species are also causing adverse effects to rocky shore communities on a local scale. In addition, species composition of interfidal rocky communities in the Western	these habitats there could be a very slight increase in impact from emergence regime changes (hydrological changes to emergence regimes from new tidal barrages	precommant relocat types - Rearge are of sealing value. 1.5 - Habitat Extent - All listed (special) and predominant. Same as reasonable confidence target habitat types - Area is stable or increasing and not smaller than the baseline value (Favourable Reference Area for	degradation (apart from on a small scale at a local level).
sensitive to abrasion.		Channel and Celtic Sea region is already impacted by warmer waters due to climate change.	these habitats the area of impact from this pressure amounts to between 0.001 and 2.3% of the habitat. A local scale, the development of tidal range devices may result in sionificant impacts on some littoral intertidal	Habitats Directive habitats).	
			habitats. Pressures relating to physical change and physical damage were not assessed as being relevant if these habitat types (i.e. they were not considered to be subject to these pressures). However – assessments for littoral habitats are likely to be low in confidence partly due to due to poorly resolvet habitat information and partly due to the lack of analytic.	1.6 - Habitat condition and 6.1 - physical damage - All Same as reasonable confidence target listed (special) & predominant habitat types - Area of habitat below GES (as defined by condition indicators) must not exceed 5% of the baseline value (Favourable Reference Area for Habitats Directive habitats	
Marine Mammals Recreation and cultural services	Population and distribution of Grey and harbour seals.	<u>Cetaceans</u> - Taking into account the 2007 Favourable Conservation Status (FCS) assessments of all cetacean species occurring in UK waters, assessment was considered.	assessment methods. Increases in anthropogenic underwater noise, particular as a result of percussive piling during offshore wind farm	V.1 - Species distribution -In all of the indicators monitored, Same as reasonable confidence target	Difference between GES targets and BAU is hard to assess. It is not possible to say whether
		favourable for the five species that are most abundant in UK waters (harbour porpoise, [common] bottlenose dolphin, white-beaked dolphin, fin whale and minke whale). The status of a further six species was unknown due to a lack of suitable abundance estimates. The remaining 17 species are considered rare or vagrant and therefore it is no	construction have the potential to affect the distribution of marine mammals, particularly in Region 2 where a high proportion of future offshore wind development is		there is degradation for cetacean species, although there is likely to be some degradation for harbour seals. Trends in cetacean species are unknown, and although CP2 gave favourable
		possible to assess their conservation status in UK waters. Overall, as a group the condition of cetaceans has been assessed as follows:	displacement is currently unclear and this is managed under the current licensing process. Future levels of by	1.2 - Population size and 4.3 Abundance/distribution of key Same as reasonable confidence target	assessment for the 5 most commonly found species (based on FCS assessments),
		 Greater North Sea sub-Region: good condition in the Northern North Sea (CP2 Region 1) and the Southern North Sea (CP2 Region 2), poor condition in the Eastern Channel (CP2 Region 3) due to historical bycatch. 	catch are unclear. While collisions between vessels and marine mammals do occasionally occur, the numbers of individuals involved varies between species - for porpois	should be no statistically significant decrease in abundance	confidence in this assessment was low. Some of the key pressures on mammal speices are likely to decline between now and 2020, but we
		 Celtic Seas sub-Region: moderate condition in the Western Channel and Celtic Sea (CP2 Region 4), the Irish Sea (CP2 Region 5) and the Minches and Western Scotland 	collision less common than by-catch, for some whale species collision is more common than by-catch (base		don't know enough to say what the overall effect would be. The big unknowns include the impact
		(CP2 Region 6). The status of cetaceans is unknown in the Scottish Continental Shelf (CP2 Region 7) area and offshore waters north and west of Scotland (CP2 Region 8). Most significant pressures likely to be by-catch (trend unclear), contaminants (downward	on stranding scheme data). Pressure from shooting of seals is likely to decrease following legislation implemented earlier this year under the Marine Scotland	1.3 - Population condition - There should be no statistically Same as reasonable confidence target	on cetacean distribtions of increases in noise and the impacts on cetacean and seal abundance of changes in availability of prey species (which
		Itend), noise (upward trend) and changes in prey abundance-both due to fishing and climate change (frend unknown). <u>Grey sealls</u> - Population in 2010 was estimated to be 113,300 (95% CI 93,800.139,700). <u>Populations have been increasing following historic culling, but that increase now levelling off probably due to density dependent factors affecting the population as a whole (probal pup mortality).</u>	Act 2010 to require licensing of shooting.	significant decline in seal pup production and bottlenose dolophin calf production; and mortality of marine mammals due to fishing by-catch should be sufficiently low to not inhibit population size targets being met	could be impacted by both fisheries or climate change). Trends in grey seals are positive and it is likely that there is no difference between BAU and GES - so no degradation. Trends in harbour seals are negative, so there is likely to be a difference between BAU and GES and therefore
		<u>Harbour seals</u> - UK has large numbers of harbour seas, most notably in regions 6 & 7, but also small populations in eastern England. Population is estimated at 25,936. There have been significant declines in populations in Orkney, Shetland and off the East coast of	e	4.1 - Productivity of key species - There should be no Same as probable certainty scenario	some degradation, although very unclear whether this is due to anthropogenic pressures or natural factors.
		Scotland (more than 50% since 2001), populations on west coast of Scotland have remained stable. PDV outbreaks have seriously affected populations of the east of England (50% decrease in 1998 and 22% in 2001) - numbers in the Wash are back to pr PDV levels. Cause of declines unknown but pressures include, competition with grey seals, predation by grey seals (in the Moray Firth and East Anglal), predation by killer		statistically significant decline in seal pup production and bottlenose dolphin calf production	
Commercial Fish Whitefish (Cod,Haddock,Whiting), Monkfish/Anglerfish, Other Demersal Species, Mackerel, Crabs, Nephrops, Other Shellfish Provisioning services	rays - which are slow to reach maturity and have generally low fecundity are vulnerable and populations have fallen significantly in the last 100 years. The same is true of deep sea species like Orange roughy and Black scabbardfish - as well as	whates, fir the Northern Isles Lifectines in innontant new snecies that from climat. The scientific advice from ICES (2010) suggests that there are a number of stocks whos position is improving - including North Sea haddock, whiting, plaice, sole and herring; West of Scotland herring and Nephrops; Celtic Sea cod; and Channel sole - suggesting exploitation is at sustainable levels. However, only some of these eg North Sea haddoct and Western Channel sole are being exploited at levels commensurate with MSY and have stocks sizes estimated to be sufficiently high to ensure long-term sustainability. An	as targets are set such that MSY is not necessarily achieved until 2020. However, those stocks already at of around MSY (eg North Sea haddock) are likely to be maintained at this level through the setting of annual thatch and effort limits to keep exploitation rates within th		Likely to have degrdation as Targets are set such that MSY is achieved by 2020. Simon can we say anything specific about the individula stocks?
	eels and sturgeons. What is more, the situation fo thse species is not expected to improve in the neal future. Stocks of cod in most sea areas remain	many stocks particularly those of cod are some way below desirable levels. It is therefor assumed that without the introduction of the Marine Strategy Framework Directive, the reformed CFP would simply prevent any further significant delerioration in fish stocks (an certainly collapse), but will not deliver significant progress in achieving objectives such a the recovery of stocks to support Maximum Sustainable Yield (MSY) across fisheries, or	necessary bounds. For other stocks, the CFP will be attempting to effect a gradual transition towards MSY to avoid destabilising the fishing industry. Some will showever require more targeted conservation measures		

	whiting, haddock, plaice, sole, herring and mackerel are doing well (particularly those in the	iuny-miegrateu ecosystem-oaseu management approach to instienes. This may nower be partly due to time lags in stock recovery and impacts from other pressures such as climate change. Recovery plans assume that recruitment will follow a historic relationsh between the level of new recruits and the ultimate Spawning Stock Biomass This assessment comes from Charting Progress 2.	species, etc. And in some cases, supplementary	Same as probable certainty scenario		
Seabirds Recreation and cultural services			seabirds. In terms of changes in the pressures affecting seabirds, climate-related changes are likely to continue, pressure from fisheries is likely to reduce as the CFP moves towards MSY (but undear how fast this change would happen in the absence of MSFD). The extent of the impact from bycatch on seabirds in UK waters is unknown. Pressure from by-catch is likely to reduce if a European Action Plan on with pressure from Europe to divevelop a seabird by-catch programme is defined and implemented within the next 10 years.	population distribution of marine birds in 75% of species monitored. Population size 1.1 and abundance/distribution of key trophic groups 4.3: Changes in abundance of marine birds should be within individual target levels in 75% of species	Species distribution 1.1: No major shifts or shrinkage in the population distribution of marine birds in 90% of species monitored. Population size 1.1 and abundance/distribution of key trophic groups 4.3: Changes in abundance of marine birds should be within individual target levels in 90% of species monitored. Same as reasonable confidence target	It is considered likely that there is some degradation in relation to seabirds. It is likely that warming sea temperatures resulting from global climate change will continue to have a negative impact on some prey fish species and a continued incidence of poor breeding success and decline in population size of those seabird species that depend on them. Climate change in distribution and declines in population size of some species. Under a BAU scenario some of these climate impacts may be mitigated by changes in CPP depending on the extent of their positive impact on prey fish populations. The measures recommended to achieve GES under the targets proposed for birds will collectively mitigate climate impacts to a greater extent han CFP reform alone: a) The attainment of MSY in commercial species sandele and herring will, if implemented at appropriate regional scales (for the birds) will enhance food availability to local seabird populations. b) the removal of invasive predatory manmals from key seabird colonies will increase the amount of available safe breeding habitat available and enable perhaps greater access during the breeding season to good foraging areas. c) measures to reduce seabird bycatch may lead to an increase in survival rates amongst many species of seabird.
	fundamental to the carbon cycle and so implicated in climate regulation. This is nature's equivalent of Carbon Capture & Storage'. Some habitats will be more important than others in climate regulation; the total productivity of the habitat and /or the 'production:biomass ratio' might be used as an indicator of that relative importance. Detoxification and purification-all predominant habitats can be considered as being instumental in the long term (decadal) bio-remediation of poliution events (e.g. oil spills, fish farms) and the on-going (daily) purification of water through microbial	trawls, and been to lost because of construction, coastal infrastructure or disposal of dredged materials. It is recognised that CP2 significantly underestimated the area of subtidal rock in KK waters. More modern maps such as SealMap2010 show extensive areas of the UK continental shelf as rock. The CP2 assessment of the state of these habitats is probably still valid. Shallow subtidal sediments—impacted by several pressures and there is considerable variability in the in the distribution and/or severity of the impacts. Large areas of subtidal sediments in most regions have been adversely affected by mobile fishing gears. At a local scale pressues include damage caused by extraction of aggregates, nutrient enrichment and pollution. Non-native species are spreading in the subtidal coastal areas	expected to be physical damage through structural and surface abrasion of the seabed from demersal fishing activity (e.g. trawling and dredging). This pressure is more significant than changes toloses of physical substrates (e.g. from the footprint of construction or aggregate extraction) by an order of magnitude. Areas of habitats impacted by structural abrasion/penetration from fisheries dredging- in 2020 most habitat types would be subject to high and medium intensity of impact in less than 2% of the habita area, the exceptions are subtidal course sediments	1.5 - Habitat Extent - see targets above for intertidal sediment and intertidal rock	1.4 - habitat distribution - see targets above for intertidal sedime and intertidal rock 1.5 - Habitat Extent - see targets above for intertidal sediment and intertidal rock	component as both CP2 and the BAU scenario suggest that the targets prosposed for GES under both the reasonable certainty and higher certaint scenarios are not being met, and are unlikely to be met in 2020 under BAU. Extent of degradation is more significant for predominant sediment habitats than for rock habitats. It is
	feeding organisms which are instrumental in removing particualte matter from water - hence instumental in purification. Aquatic plant habitats are instrumental in coastal water purification.	habitats may mean that their sensitivity to such pressures is much higher than that of shallower water habitat types. Although fishing represents the main pressure on these habitats their current status varies by region, with large greas of habitat impacted in the	habitat types could be subject to high and medium intensity of impact in more than 10% of the habitat area, some significantly more than 10% - moderate energy cirallitoral rock (30%), low energy circalitoral rock (13%), subtidal course sediment (19%), subtidal sand (13%), subtidal mud (65%), subtidal mixed sediments (12%).	1.6 - Habitat Condition and 6.1 - Physical damage - see targets above for intertidal sediment and intertidal rock	1.6 - Habitat Condition and 6.1 - Physical damage - see targets above for intertidal sediment and intertidal rock	
Litter Aesthetics, recreation and potentially health	Items per kilometre, of different types (hard plastics, polypropylene twine, rope, etc.)	Some problems with beach litter in all sub-divisions within the Greater North Sea and the Celtic Seas sub-Regions where there are systematic surveys. Less info available for northern Celtic sea. CP2 Fig 4.16 – number of beach litter items per kilometre.	Increase in recreation compared to CP2, owing to environmental improvements and warmer waters. No assessment of sesthedics possible. In summary, we have assumed that, under the current regulatory regime, little will confinue to be a problem accumulating in coastal areas (indicator 10.1) and in the water column (indicator 10.1.2), Littler will confinue to affect suctivation and indicator through smothering and attraction and affect marine mammals, untries and fairly populations through entanglement and ingestion.	Decreasing trend (where litter levels are shown to be rising or unacceptable) in the number of visible litter item within specific categories/types on the coastline from 2010 levels by 2020.	Overall reduction in the number of visible litter items within specific categories/types on coastlines from 2010 levels to 2020 (preferred option).	Given the fact that the BAU report suggests that litter levels on coastlines will continue to increase it can be concluded that there will be degradation in relation to this component when compared both to the reasonable and higher confidence GES target scenarios. The units of degradation to be looked at will be: change in visitor numbers, damages to boats.
				seafloor (preferred option). Surveillance indicator to monitor trends in plastic found in	Decreasing trend (where litter levels are shown to be rising or unacceptable) in the number of visible litter items within specific categories/types on the seafloor from 2010 levels by 2020. Trends in the levels of pla	-
Organic Enrichment (Aesthetics)		No assessment done as we will meet GES under GES	No assessment done as we say we will GES under GES	We say we will meet GES under business as usual, so no		No degradation
Contamination (synthetic, non- synthetic and radio-nuclide) (Aesthetics and *peace of mind*)		No assessment done as we say we will achieve GES under BAU	No assessment done as we say we will GES under GES	We say we will meet GES under business as usual, so no i	need to quantify the difference.	No degradation

Saltmarsh, seagrass, macroalgae and plankton (carbon regulation)		More of relevant components present in 2020 than in CP2, due to MCZs, but difference expected to be minimal	No target proposed, but monitoring for the proposed indicators would be put in place.	Distribution of plankton community not significantly influenced by No degradation anthropogenic drivers