

SeaView Report

Environment Agency and Sussex Inshore Fisheries and Conservation Authority

Chichester Harbour 2017



Sussex Marine and Coastal Forum



**Arun & Western
Streams Partnership**

A healthier future for our catchment



**Environment
Agency**



Contents

	Summary	1
1.	Introduction	2
1.1	The SeaView Project	2
1.2	About Chichester Harbour	3
2.	Legislation overview	5
3.	Assessment of environmental Indicators	8
3.1	Physical Environment	8
3.2	Water quality	10
3.3	Ecological health indicators	12
3.4	Additional factors	18
4.	Initial gap analysis	20
5.	Looking forward	21
6.	References	22

Executive summary

This report provides a brief introduction in to the Chichester Harbour SeaView vision, the various elements of water quality, and the legislation that underpins the current targets for an improved marine environment. Chichester Harbour, the first area In Sussex covered by the Seaview project, is a waterbody that is covered by a wide range of both marine and terrestrial legislation. A working group set up in 2015 agreed upon a total of 20 environmental indicators, these were divided in to four categories: The physical environment; water quality; ecological health indicators; and additional factors. Each of the environmental indicators were individually reviewed and assigned a Red, Amber or Green (RAG) status, depending on whether a target had been set, reached, both or neither. Only 3 of the 20 indicators fell in to Red status, which shows the great work that all agencies are putting in to improving the marine environment. The majority of the indicators fell in to the Amber category, 16 in total, many of which are the focus of projects currently underway, and are likely to meet the targets set for the coming years. However, there is a need to address missing targets and management regimes for many of these amber indicators. The collection of targets also enables us to take a step closer to defining good ecological or environmental status.

Following on from this report and the acknowledgment of areas that may require further action, stakeholders, principally through the Arun & Western Streams Catchment Partnership, will be able to assess the likelihood of all current targets being met within the predicted timelines. Additionally, discussions can take place between stakeholders surrounding the work areas that currently have no targets or are under no management with a view to kick starting actions.

1. Introduction

1.1 The SeaView Project

The SeaView project aims to deliver a vision of partnerships working towards improved water quality across Sussex. By assessing the current benchmarks set by marine legislation, and providing an overview of the current marine legislation in place, the broad spectrum of partners will be able ensure that the agreed environmental outcomes are met.

There are a number of important regulatory drivers for creating a better local marine environment. These include the Marine Strategy Framework Directive (MSFD), the Water Framework Directive (WFD), Habitats and Birds Directives, the Shellfish waters directive, Inshore Fisheries Conservation Authority (IFCA) byelaws, the South Downs National Park objectives and the UK Marine Policy Statement. Much of this is also translated into the South Marine Plan. The broad aim of the UK Government is to have clean, healthy, safe, productive and biologically diverse oceans and seas. To achieve this all stakeholders need to work as efficiently together, with clear objectives and by efficiently sharing resources.

The objectives of SeaView are to:

- Identify and value the differences within our Sussex estuaries and coasts.
- Create a detailed, collective vision for Sussex marine environmental quality.
- Describe what good ecological/environmental status looks like.
- Understand current actions and create a forward look for new required actions.

In order to establish where these potential improvements are, there first needed to be a discussion and review of the evidence available by various partners, followed up by establishing which locations would be suitable for review. The first phases of the project have been carried out by the Sussex Marine and Coastal Forum together with the Arun & Western Stream, Adur & Ouse and Cuckmere & Pevensey Catchment Partnerships (see figure 1, below). This report details how stages three and four have been carried out by a joint Environment Agency and Sussex Inshore Fisheries & Conservation Authority project.

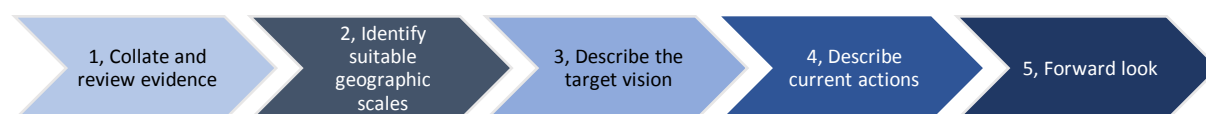


Figure 1: The five stage approach to the SeaView project.

Using the existing environmental legislation as a benchmark, the reports main aim is to assess current actions and eventually create a forward look for new required actions to improve marine environmental quality where necessary, identifying any gaps in knowledge along the way.

The environmental indicators that will be detailed in this report fall in to 4 categories:

- Physical environment
- Water quality
- Environmental health indicators
- Additional factors

Each indicator has a target set, which is assessed by the responsible organisation or statutory authority, depending on which piece of environmental legislation it is underpinned by. These targets in some instances are numerical, whereby a physical value is able to be put in place as a benchmark to reach, or a level in which site condition should not fall below. Several targets however are dictated by policy, and within these policies there are guidelines to follow to reduce or minimise any footprint on the environment. Marine ecosystems are, however, characterised by dynamic processes which are often dictated by constant changes in the biological communities that exist in a particular area. A target may therefore also be defined as a range of numerical values within which fluctuations may occur.

This report reviews the indicators within each category, detailing the targets set and the current status of each indicator, as well as helping to identify any current gaps in knowledge that may need addressing in future. The overall goal is to help describe what good ecological potential and status looks like (Water Framework Directive) and what good environmental potential looks like (Marine Strategic Framework Directive), as well as create a collective vision for Sussex marine environmental quality. Table 1, below, is a summary of the environmental indicators in each of the four categories.

Table 1: The environmental indicators considered within the Sussex SeaView project.

Physical Environment	Morphology – Developed coast/semi natural habitat
	Heritage and Archaeology
Water Quality	Dissolved Oxygen
	Dissolved Inorganic Nitrogen
	Heavy metals
	Bacteria load (i.e. <i>E.coli</i>)
	Acidification
Environmental Health indicators	Phytoplankton
	Excessive algal growth
	Benthic invertebrates
	Designated site condition
	Migratory fish (salmonids, eel, shad)
	Estuarine fish
	Sea fish
	Shellfish waters and shellfisheries
	Marine mammals
Over winter/migratory birds	
Additional factors	Noise
	Marine litter
	Alien species

1.2 About Chichester Harbour

Chichester Harbour is an estuary covering an area of 3,695 hectares. The Water Framework Directive describes the estuary as a transitional waterbody. It has a wide variety of marine sediment habitats including extensive areas of estuarine flats, and intertidal areas often supporting eelgrass (*Zostera* spp.) and green algae, saltmarshes and natural shoreline transitions, such as drift line vegetation. Many of the intertidal areas within the harbour are important for a number of nesting and feeding birds. The harbour also has a resident common seal colony and acts as a nursery area for many

species of juvenile fish such as bass. It falls within the wider Solent area and is part of the Solent Maritime Special Area of Conservation (SAC), and Chichester and Langstone Harbour Special Protected Area (SPA). SACs and SPAs can collectively be called Natura 2000 sites. Other notable designations include Chichester Harbour Area of Outstanding Natural Beauty (AONB) status and Chichester Harbour Site of Special Scientific Interest (SSSI).

The harbour consists of 5 main channels (see figure 1 below) and has 3 main surface freshwater inputs; the River Ems, Bosham stream and the River Lavant, which, along with groundwater, storm water discharges influence the water quality within the harbour. The harbour is flushed by diurnal tides however there are regular inputs of pollutants in to the waterbody. Likely sources of pollution include sewage discharges and runoff from the surrounding landscape, including animal waste, and industrial activities. There are three Waste Water Treatment Works (WWTW) at Apuldram, Bosham and Thornham that discharge treated effluent into the Harbour. There is a high level of human activity within the site; around 12,000 boat users regularly using the waterways for both commercial and recreational purposes.

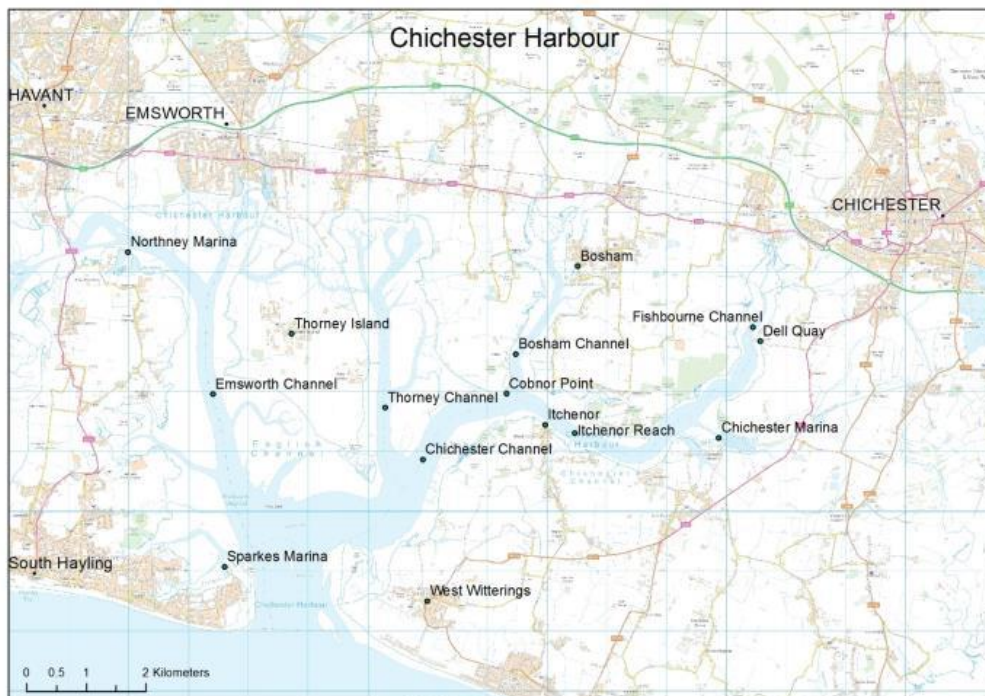


Figure 1: The five main channels which make up Chichester Harbour. Fishbourne Channel, Chichester Channel, Bosham Channel, Thorney Channel and Emsworth Channel.

2. Legislation overview

The following is a brief summary of the main legislation in place which provide the guidelines for monitoring and protecting the ecological status of the environment. Each Directive, Regulation or Byelaw has been put in place either by the European Commission, UK Government or local Authorities. To access a full copy of each of the following, click the embedded hyperlinks.

[Water Framework Directive](#)

Covers groundwater and surface waters e.g. rivers, canals, lakes, reservoirs, estuaries and other brackish waters, coastal waters (out to one nautical mile), and the water needs of terrestrial ecosystems that depend on groundwater, such as wetlands. The main aim of the WFD is to get European waters to good quality and to involve all stakeholders. Groundwater quality is reflected by surface water, since surface waters receive continuous discharge of ground waters. As a hidden resource it makes quality monitoring, pollution prevention and restoration even more difficult. The groundwater directive was set up within the WFD, and the Urban Wastewater Treatment Directive and Nitrates Directive fall within it. The WFD also contains the requirement to assess designated shellfish waters as previously covered by the Shellfish Directive.

[Urban Waste Water Treatment Directive](#)

Set up to protect the environment from adverse effects of urban wastewater discharges. The directive requires the collection and treatment of waste water in all agglomerations of more than 2000 population equivalents, and the pre-authorisation of any discharges from certain industrial sectors (food-processing industry and industrial discharges in to urban wastewater collection systems). Diffuse pollution sources are being tackled by initiatives including the Solent Diffuse Water Pollution Plan, Catchment Sensitive Farming and Downs and Harbour Clean Water Partnership.

[Nitrate Directive](#)

The Directive aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters by promoting the use of good farming practices. This is undertaken by identifying eutrophic waters, or waters at risk of eutrophication, which are then designated as Nitrate Vulnerable Zones (NVZs). Codes of Good Agricultural Practice have been set up to be implemented by famers on a voluntary basis, as well as action programmes within NVZs which are compulsory. These are to be monitored nationally and reported on every 4 years.

[Marine Strategy Framework Directive](#)

Part of the Marine Directive which aims to achieve 'Good environmental Status' (GES) of EU marine waters. This directive sets out [eleven qualitative descriptors](#) which define what the environment will look like when GES has been achieved. This directive protects the ecosystem in a legislative framework considering the management of human activities which are having an impact on the marine environment. It integrates the concepts of environmental protection and sustainable use in what is known as the ecosystem approach to environmental management.

MSFD explicitly recognises the overlaps with WFD and makes it clear that in coastal waters, MSFD is only intended to apply to those aspects of GES which are not already covered by WFD (e.g. noise, litter, aspects of biodiversity). Further guidance can be found in Defra's factsheet:

<http://archive.defra.gov.uk/environment/marine/documents/legislation/msfd-factsheet1-waterdirective.pdf>.

[Habitats Regulations](#)

Set up under the EU habitats and birds directive to protect European Marine Sites (EMS) and European species of conservation interest. The regulation allows for agencies to enter in to management agreements on land, within or adjacent to EMS's. Where agreements cannot be reached, byelaws are able to be set up once Special Areas of Conservation and Special Protection Areas have been designated to manage the conservation of the sites directly.

[Protection of Wrecks act](#)

This act allows for the designation of a restricted area around the site of a vessel lying on or in the seabed in UK territorial waters if the vessel, its contents or former contents are of historical, archaeological or artistic importance. The act protects the site from unauthorised interference.

[Sussex IFCA Chichester Harbour EMS prohibition of fishing method Byelaw](#)

This Byelaw prohibits the use of towed fishing gears, digging, collection and hand gathering of marine fisheries resources in specified areas of Chichester Harbour to protect Seagrass (*Zostera* spp.) and therefore prevent damage or deterioration to the Solent European Marine Site.

[Sussex IFCA Chichester Harbour Oyster permit Byelaw](#)

Commercial permits are required to fish for oyster within Chichester Harbour and this can only occur at a specific time in the year. The Byelaw provides a responsive adaptive management for oyster fisheries and supports the development of sustainable fisheries through catch restrictions, gear configuration through permit conditions, allowing stock management at sustainable levels to maximise long term economic benefit.

[Sussex IFCA Shellfish Permit Byelaw](#)

The Shellfish Permit Byelaw establishes a permit based system for both the commercial and recreational exploitation of shellfish species fished for by pots and traps. The provisions within the byelaw enable a responsive approach to the management of the fisheries applying adaptive management based on best evidence. The species covered in the byelaw include Lobster/Crab, Whelk and Cuttlefish.

[Sussex IFCA Fixed engine Byelaw](#)

The fixed engine Byelaw prohibits the use of nets, either fixed or drift netting, within the harbour from October to April. This is in order to allow the passage of salmonids in to and out of the harbour when migrating for breeding purposes.

[Bass Nursery Area](#)

Chichester Harbour is a Bass Nursery Area. Under The Bass (Specified Areas, Prohibition of Fishing, Variation) Order 1999, fishing for bass, or fishing for any fish using sand-eels as bait, by any fishing boat within any part of the harbour as defined, is prohibited between 30th April and 1st November.

[The Salmon and Freshwater fisheries act](#)

Encompasses the protection of sea trout and salmon through prohibition of the taking or destroying of fish through certain methods and obstructions to the passage of fish. There is also protection in the form of controlling the times of fishing and selling, and licencing to catch these fishes.

[Food safety and Hygiene directive](#)

Ensuring that harvested shellfish are safe for human consumption by means of regular bacterial monitoring of shellfish samples.

[Birds Directive](#)

The Birds Directive was set up by the European Commission with the aim of protecting all naturally occurring wild bird species in the European Union. It is under this directive that Special Protection Areas (SPA) are established. The sites are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.

[Invasive Alien Species Regulation](#)

Set up by the European Union to address the problem of invasive alien species in a comprehensive manner so as to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have.

3. Assessment of environmental Indicators

In this section there will be an extended look at the environmental indicators listed in Table 1. Targets set under each piece of legislation are reviewed alongside the status against each target as informed by the relevant organisation or authority. As mentioned in section 1.1, some targets set do not have a numerical value, they may appear to be in the form of a policy or strategy. In these instances, where there are no specific numerical targets set, information will be provided on the implementation of policies to reduce the risk of deterioration within the site for that indicator.

The overall WFD water body status for Chichester Harbour according to the EA Catchment Data Explorer is 'Moderate' with the target being 'Good by 2027' (Environment Agency 2016). The EA WFD Monitoring Strategy briefing note for waterbody classification states that a water body is only classified as high status if it has passed all three additional tests for high status. The three tests are:

- A hydrological/tidal regime that reflects totally, or nearly totally undisturbed conditions
- Morphological conditions that reflect totally, or nearly totally undisturbed conditions
- No evidence of established populations of alien species

We have graded the comments box with a RAG status (red, amber, green) to indicate the following;

Green	Management in place and target met
Amber	Either no management or no target in place
Red	No management and no target in place

3.1 Physical Environment

Includes the aspects of the harbour which are considered to be man-made

Morphology – Developed coast and Semi-natural habitat

Morphology is detailed in the SeaView table as being covered under the Water Framework Directive. The Environment Agency, through River Basin Management Plans, monitor significant water management issues, one of these is 'physical modifications'. Modifications may alter natural flow levels, cause excessive build-up of sediment in surface water bodies and the loss of habitats and recreational uses. In many cases the uses and associated physical modifications need to be maintained, e.g. flood risk management structures. In these circumstances it may not be possible to achieve good ecological status. The aim is to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status.

It was also noted that the Chichester Harbour Conservancy have provided documents as guidance for people or businesses who may be thinking about developing or extending a property within the Chichester Harbour AONB in order to maintain preserve the natural, and semi natural environment within the harbour. Firstly, the conservancy have provided a 'Planning principles' document which covers all aspects of anthropogenic activity within the harbour, and how to manage development accordingly. The Conservancy are tasked with maintaining the natural environment whilst at the same time considering sustainable forms of industry and important socio-economic needs of the local community. Secondly, the 'Sustainable Shorelines' document provides further guidance for

sustainable shoreline management. This document provides guidance such that all development relating to sea defences within the harbour is considered with respect to both the environmental and cultural designations, as well as offering advice on the variety of different options available to potential developers in the area. Both of these documents set out clear ways to consider minimising the human footprint on the environment and can be considered as targets for sustainable development within the harbour, if used as development occurs.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Morphology – Developed coast and Semi natural habitat	Water Framework Directive	Environment Agency and Chichester Harbour Conservancy (CHC)	Supports good by	Good Ecological Status through the following: EA River Basin Management Plans. CHC Planning Principles; Sustainable Shorelines document	Status is unclear, but there is CHC policy guidance in place for developers.

Heritage and Archaeology

Covered under the Protected Wrecks act, it is important for the area to be able to maintain any sites of significance with regards to heritage and archaeology. [Historic England](#) has produced guidance on protecting heritage assets. There are no protected wrecks with Chichester Harbour. The Wessex Archaeology [Environmental Policy](#) details the different ways in which the environment is considered when undergoing any work at a heritage site. Although there are no physical targets available to work towards, the environmental policy sets a benchmark for working standards and is in place to minimise the footprint left by work being undertaken at any site.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Heritage and Archaeology	Protected Wrecks Act	Historic England	Unknown	unknown	Status is unclear, but policy guidance available for works impacting heritage sites.

3.2 Water Quality

The following are environmental indicators which reflect the overall water quality of Chichester Harbour.

Dissolved Oxygen

Monitored as part of the Water Framework Directive, dissolved oxygen levels in Chichester Harbour are stated as 'High'. This information has been gathered from the Environment Agencies Catchment Data Explorer. There are no stated targets going forward from 2015, from this it is assumed that maintaining current levels of dissolved oxygen from 2015 is the target.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Dissolved oxygen	Water Framework Directive	Environment Agency	High	Good by 2015	Current status higher than target status. Maintain current levels.

Dissolved Inorganic Nitrogen

Listed as being a Significant Water Management Issue (SWMI)*, Dissolved Inorganic Nitrogen (DIN) in Chichester Harbour is described as being 'Moderate' in the EA Catchment Data Explorer. The target set for this indicator is 'Good by 2027' under the WFD, with good status defined as being back to 'natural conditions'. The levels of DIN in Chichester Harbour is effected by both point source (sewage discharge) and Diffuse source (mixed agricultural) pollution. Management measures are in place in order to reduce DIN.

* Significant Water Management Issues (SWMI) are the most nationally significant issues affecting the water environment, as determined by evidence gathered by the Environment Agency.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Dissolved Inorganic Nitrogen	Water Framework Directive	Environment Agency	Moderate	Good by 2027. Expert (EA) opinion indicates an approximate value of 0.5mg/l, depending on other variables.	Work currently underway to address DIN levels in catchment area.

Heavy metals

Monitored under the WFD, the status on heavy metals as of 2015 is listed as good. The substances monitored by the Environment Agency are constantly reviewed on a risk based approach. The substances listed as heavy metals are no longer monitored as there has never been any issues with them for Chichester Harbour in the past. Examples of such substances found in the marine environment include pesticides, anti-foulants, pharmaceuticals and heavy metals, among others.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Heavy metal	Water Framework Directive	Environment Agency	No current monitoring	No current target	No issue within Chichester Harbour for heavy metals. Monitoring occurs on a risk based approach.

Bacterial Load

The urban wastewater treatment directive requires that programmes are put in place to ensure that both discharges from urban wastewater treatment plants and receiving waters are monitored. The directive requires that waste water be collected and treated in all agglomerations of >2000 population equivalents. Secondary treatment also required for agglomerations of >2000 population equivalents; and advanced treatment for agglomerations of >10,000 population equivalents. Water Company discharges, which account for a proportion of bacterial load, are managed through a well-structured periodic review process.

Bacterial content of shellfish is monitored routinely by Chichester District Council (Environmental Health), see Section 3.3 'Shellfish and shellfisheries'.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Bacterial Load	Urban Wastewater Treatment directive Water Framework Directive	Environment Agency	See shellfish water classification; Table 2, section 3.3.	No discernible target.	No clear target for bacterial load, however monitoring of shellfish waters undertaken by Chichester District Council.

Acidification

No current monitoring or targets. Global ocean acidification is a recognised environmental issue related to carbon dioxide levels and climate change.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Acidification	N/A	N/A	Unknown	Unknown	No current monitoring or targets.

3.3 Ecological Health indicators

Phytoplankton

This indicator is monitored as part of the WFD and as of 2015 the status of phytoplankton levels in Chichester Harbour is labelled 'high', the target being 'good by 2015'. There are no targets set beyond 2015, so it is assumed that maintaining the current levels of phytoplankton is the target. This ecological indicator links in with levels of DIN in the marine environment and eutrophication, meaning high phytoplankton levels may not reflect good ecological status.

Summary:

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Phytoplankton	Water Framework Directive	Environment Agency	High	Good by 2015	Although target has been reached, it may not equate to 'Good ecological status' when linked in with DIN and excessive algal growth within the harbour.

Excessive algal growth (Eutrophication)

The current status of macroalgae as documented in the EA Catchment Data Explorer is 'moderate' with the target of 'good by 2027'. The Environment Agency undertake regular monitoring of algal mat extent in the harbour for WFD, additionally this environmental indicator links in with work surrounding Dissolved Inorganic Nitrogen in the harbour. The importance of reducing algal mat cover within the harbour cannot be understated as eutrophication can have detrimental consequences on biodiversity. In turn this can affect the designated site conditions impacting on e.g. birds.

Excessive algal growth is also being monitored as part of the Nitrates Directive, which aims to identify water polluted, or at risk of pollution. Any surface freshwater or groundwater containing, or could contain, 50 mg/l of nitrates is deemed polluted and therefore designated as a Nitrate Vulnerable Zone.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Excessive algal growth	Nitrates Directive Water Framework Directive	Environment Agency	Moderate	Good by 2027	Links in with DIN. A working group associated with the catchment partnership is currently looking at tackling excessive algal growth in the harbour.

Benthic Invertebrates

Under the WFD, benthic invertebrates are monitored and then classified based on a series of calculations in what is called the Infaunal Quality Index. This allows for an assessment of the ecological health of benthic infauna. It is from this that the ecological status of benthic invertebrates is listed in the Catchment Data Explorer as 'Moderate', the target being 'Good by 2021'

[Infaunal Quality Index](#) overview.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Benthic Invertebrates	Water Framework Directive	Environment Agency	Moderate	Good by 2021	Monitored, but unclear if work is underway to meet the target status.

Designated site condition

Under the Habitats Regulation a Common Standard Monitoring process was set up and used in the assessment and setting of targets for designated site conditions across the UK. This led to a site being deemed in either 'Favourable' or 'Unfavourable' condition, targets which are not numerical. The default based approach was adopted for this assessment, whereby if one attribute of a feature was deemed unfavourable, then that whole feature would be deemed unfavourable. The JNCC (2004) stated that 'feature conditions were determined using information drawn from previous surveys and local expert knowledge of the site, together with generic information on trends and/or natural variability in the state of features gathered from the wider literature'.

With the above considered, according to Natural England's 'Designated Sites view', **84.73%** of the Chichester harbour SSSI is described as being in an 'unfavourable - recovering' condition and **15.26%** is deemed to be 'Favourable' condition.

The condition assessments for the Chichester and Langstone Harbour SPA and the Chichester Harbour units within the Solent Maritime SAC are based on these findings. According to Natural England projects will be underway in the near future to establish the condition of the features within these designations.

The WFD associates ecological status in a waterbody with the status of its designated Natura 2000 sites.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Designated site condition	Habitats Regulations Water Framework Directive	Natural England Environment Agency	Unfavourable – recovering.	Recover to favourable condition.	Common Standard Monitoring of SSSI indicates the site is in an unfavourable condition. SAC/SPA feature conditions inferred from SSSI

					<p>condition assessments.</p> <p>Some feature attributes within the assessments, are informed from baseline data gathered by the Environment Agency.</p> <p>Natural England area teams due to commence condition assessment programmes in 2016/17.</p>
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Migratory fish (salmonids, eel, shad)

Although there are no specific targets set for these fish, maintaining the habitat, the fish and their safe passage is of high importance to Defra. These migratory fish are protected under the Salmon and Freshwater Fisheries Act. The Environment Agency provide annual statistics on Salmonid and freshwater fisheries. The Centre for Environment, Fisheries and Aquaculture Science (Cefas) provides Defra with scientific advice on migratory and freshwater fisheries. Natural England works towards conserving rivers, lakes and other waterbodies. Several migratory fish species are also protected by being present in a SAC or SSSI.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Migratory Fish	<p>Salmon and Freshwater Fisheries Act</p> <p>Water Framework Directive</p> <p>Eel regulations 2009</p>	Environment Agency	Unknown	Unknown	<p>Some management methods in place to ensure the safe passage of migratory fish, e.g. eel.</p> <p>Water quality assessments fall under the WFD.</p>

Estuarine fish

When measuring the ecological status of estuarine fish, the Transitional Fish Classification Index (TFCI) is used. This combines structural and functional attributes of estuarine fish communities to assess the ecological condition of estuarine systems. The tool provides an Ecological Quality Rating (EQR), where a rating of 0.8 to 1.0 is considered high (little or no disturbance), and <0.2 is considered

bad (Severe disturbance). To calculate the TFCI, a representative sample of the transitional waters fish community identified to species level is required; this information has been obtained through small fish surveys conducted by Sussex IFCA. Although it was found that there is no specific target status set for this environmental indicator, the sampling of Chichester Harbour showed an average EQR of 0.77 for 2014, which indicates 'good' ecological status (Sussex IFCA, 2016).

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Estuarine Fish	Water Framework Directive Bass Nursery Area	Environment Agency	Good	None set	If existing data were used it would achieve Good ecological status based on ecological quality rating of 0.77. This value is obtained from the Transitional Fish Classification Index.

Sea fish

One of the eleven descriptors laid out in the MSFD (see section 2) as an indicator contributing to the target of 'Good Environmental Status' (GES), is Commercial fish and shellfish. There are 3 attributes within this descriptor that should be fulfilled for a particular fish stock; the attributes are as follows: - "Stocks should be, (1) exploited sustainably consistent with high long-term yields, (2) have full reproductive capacity in order to maintain stock biomass, and (3) the proportion of older and larger fish/shellfish should be maintained (or increased) being an indicator of a healthy stock."

The [Common Fisheries Policy](#) (CFP) was created as a means of managing fisheries and will help achieve GES and ensure high long-term fishing yields for all stocks by 2015 where possible, and at the latest by 2020. It should be noted that CFP only deals with certain quota (Total Allowable Catch) species, which is a subset of the total number of species. The Sussex IFCA have introduced both the 'Fixed engine byelaw' and the 'Chichester Harbour EMS prohibition of fishing method Byelaw', in an effort to reduce the anthropogenic impact on fish stocks in Sussex.

For Chichester Harbour, the results of the Ecological Quality Rating for Estuarine fish can perhaps be used as an overall rating for fish fauna (both estuarine and sea fish) as the results are taken from a series of small fish surveys within the harbour.

Summary: Target 'Good Ecological Status'. Current 'good' ecological status based on Ecological Quality Rating of 0.77.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Sea fish	Marine Strategy Framework Directive	Defra	Unclear for MSFD	Good environmental Status over the whole MSFD subunit: Greater North Sea Sub region. MSFD defers to WFD on ecological elements.	A detailed target for Chichester Harbour does not exist. CFP represents a minority of marine fish species.

	Water Framework Directive	Environment Agency	Good for WFD (informal status)	No WFD target	Ecological Quality Rating obtained from annual data collection of sea fish in Chichester Harbour by IFCA small fish surveys only.
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Shellfish waters and Shellfisheries

Sussex IFCA have implemented both the Oyster Permit Byelaw, which provides a responsive adaptive management for oyster fisheries and supports the development of sustainable fisheries through catch restrictions, gear configuration through permit conditions; and the Shellfish Permit Byelaw which establishes a permit based system for both the commercial and recreational exploitation of shellfish species fished for by pots and traps.

The byelaws enable stock management at sustainable levels and maximise economic benefits from the relevant fisheries for the benefit of the community. As the harbour is a designated shellfish water, monitoring is also required to ensure that shellfish are fit for human consumption. Bacterial monitoring is undertaken by Chichester District Council, shellfish flesh bacterial levels determine the shellfish water categorisation. Table 2 below is the current shellfish harvesting classification for Chichester Harbour, the Food Standards Agency state the following with regards to shellfish water classification:

- Class A (≤ 230 E. coli/100g flesh) – shellfish can be harvested for direct human consumption.
- Class B (231 – 4600 E. coli/100g flesh) – shellfish can go for human consumption after treatment.
- Class C (4601 – 46000 E. coli/100g flesh) – shellfish can go for human consumption only after relaying in a Class A relaying area for long period of time (at least two months) or after heat treatment.
- Above 46000 E. coli/100g flesh – prohibited – harvesting not permitted.

Table 2: Shellfish harvesting classification for Chichester Harbour. Source - Food Standards Agency 'Shellfish Harvesting Classifications England and Wales' 2016/17.

Production Area	Classification zone	Species	Class
Chichester Harbour	Cobnor	<i>O. edulis</i>	B-LT
	Dell Quay	<i>O. edulis</i>	B
	Emsworth Channel	<i>O. edulis</i>	B-LT
	Prinstead	<i>C. edule</i>	C
		<i>Tapes spp.</i>	C
	Northney	<i>C. edule</i>	B
		<i>Tapes spp.</i>	B
	Thorney	<i>O. edulis</i>	B-LT
Pilsey Sands	<i>Tapes spp.</i> And <i>C.edule</i>	Preliminary C	

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Shellfish water and Shellfisheries	Water Framework Directive	Environment Agency	Failing	<300 e.coli/100g of flesh in 75 percentile of samples.	Water quality monitored under WFD. Chichester district council monitor E.coli levels in the oyster flesh, shellfish water classification detailed in Table 2, above. Sussex IFCA have byelaws in place to manage a sustainable fishery.
	Food Safety and Hygiene Directive	Food Standards Agency/Chichester District council	Variable B and C	No discernible targets	
	IFCA Byelaw	Sussex IFCA	Unknown	Targets set on an annual basis for post-harvest oyster density	

Marine Mammals

No current monitoring of marine mammals by a legislative body in Chichester Harbour as neither pinnipeds nor cetaceans are a protected features at the site. MSFD refers to marine mammals and a UK seal monitoring programme exists, but it is unclear how this relates to Chichester.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Marine mammals	MSFD	N/A	Unknown	Unknown	Volunteer run programme for recording pinnipeds in Sussex, however no formal legislation or management in place as marine mammals are not a protected feature within the district.

Migratory/Overwintering birds

The Chichester and Langstone Harbours SPA was established under the Birds Directive to protect individual species or assemblages of species, and their supporting habitat. There are currently 18 species of breeding and non-breeding species that are protected under this legislation within

Chichester and Langstone Harbours. See information for ‘Designated Site condition’, page 13, for information on the supporting habitats of birds.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Migratory/Overwintering bird species	Habitats directive Birds directive	Natural England	Favourable	Maintain in favourable condition (precise nature of this target is unclear)	General Management Approach to maintain populations of regularly occurring and migratory bird species. Supporting habitat for the bird in unfavourable condition.

3.4 Additional factors

Noise

‘Energy including underwater noise’ is one of the eleven qualitative descriptors in the MSFD that is included in the goal for overall GES in European waters. Although there are no targets set specifically for noise, there are management measures that can be put in place to reduce noise in the marine environment, especially in construction. For Example, in marine licencing applications often caveats are included about bird nesting or breeding seasons if there is work ongoing near or within a designated SPA. This kind of guidance from legislative bodies is put in place to manage and minimise the anthropogenic impact at an MPA.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Noise	Marine Strategy Framework Directive	Joint responsibility	Unknown	Unknown	No targets for marine noise. Management is in place for noise for bird colonies in/near to European Marine Sites.

Marine Litter

The Marine Strategy Framework Directive definition for this environmental descriptor as “Marine litter is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment.” At EU level, the MSFD is the dedicated binding legal instrument for assessing, monitoring, setting targets and reaching good environmental status with regard to marine litter. Within Sussex it is unclear whether there are processes in place which aim to reduce litter in the marine environment, whether it be beach

litter, floating litter, seafloor litter, micro litter, or litter in biota (litter ingested by marine animals). Guidance is available from the OSPAR commission on the [monitoring of marine litter](#) in our seas.

Chichester Harbour Conservancy, with the help of volunteers, manage to implement a regular sweep of the harbour for visible litter, however due to the size and complexity of the shoreline, it is difficult to remove all litter from the marine environment.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Marine litter	Marine Strategy Framework Directive	Joint responsibility	Unknown	Unknown	No clear management or targets in place. Volunteer programme run locally.

Invasive Non-native species (NNS)

As a descriptor within the Marine Strategy Framework Directive, action is required with regards to alien species. It is one of the 6 key objectives of the [EU Biodiversity strategy](#). In January 2015 the EU passed the 'Invasive Alien Species Regulation' which, through the GB Non-native species secretariat, aims to educate, reduce or remove and manage the problem of invasive NNS.

Environmental indicator	Legislation	Lead Authority/owner	Current status	Target status	Comments
Invasive non-native species (NNS)	Marine Strategy Framework Directive	Joint responsibility	Unknown	Unknown	Monitoring in place and awareness campaigns in operation, but no clear targets or management in place.

4. Initial Gap Analysis Observations

From the tables above it is clear that some elements of the environment are not fully represented with regard to current status knowledge, set targets or current management measures in place using our arbitrary classification system. The amount of indicators that were assigned an amber status does not reflect the amount of work currently underway; there are several indicators that will reach the required target status in the coming years.

Table 2: The RAG status of each environmental indicator assessed in the report.

RAG assessment	Environmental Indicator
Green	Dissolved oxygen
Amber	Morphology Heritage and Archaeology Dissolved Inorganic Nitrogen Heavy metal Bacterial Load Phytoplankton Excessive algal growth Benthic Invertebrates Designated site condition Migratory Fish Estuarine Fish Sea Fish Shellfish water and Shellfisheries Migratory/Overwintering bird species Noise Invasive non-native species (NNS)
Red	Acidification Marine mammals Marine litter

Only three indicators fell in to red status, meaning no target status has been set and there is no management in place, these are discussed below.

Ocean acidification is the process whereby the pH level of the ocean decreases as a result of increased uptake of CO₂ from the atmosphere. Little is known about the effects of ocean acidification on marine food webs and ecosystems, however studies have shown that increased acidification negatively impacts shell development in many species with a calcareous structure, encompassing several mollusc, echinoderm and anthozoan species. CO₂ outputs in to the atmosphere as a direct result of human activity will lead to an increased uptake of CO₂ in to the oceans, contributing to any natural decreasing trends in oceanic pH. With the above taken in to account, acidification is worth highlighting as an issue that may need further discussions in future.

Marine mammals are represented in the harbour by an established resident population of common seals (the least common UK seal). The presence of top predators, such as seals, is a good indication of general environmental quality. This iconic species is, however, not a protected features and no species specific management has been identified.

Marine litter is increasing in awareness as an environmental issue, most notably as plastic pollution and ghost fishing gears. Although awareness is growing there are no observed statutory

management measures in place to manage marine litter in Chichester Harbour. An exception could be described in sewage consents that require screening out of litter from storm discharges from the sewerage network into the Harbour. It should be noted that the Chichester Harbour Conservancy does organise volunteer litter clean ups. Additionally, the Sussex IFCA/EA led project 'Clear Seas' is a campaign which targets users of the harbour and how they are able to reduce their footprint on the marine environment.

As mentioned above, there are several indicators that will reach their target status in the coming years. Many of these indicators are also linked with one another, meaning work that is contributing to one area will lead to a separate targets being reached by the same working groups and stakeholders.

5. Looking forward

This report has provided a summary of the legislation, current status and targets which collectively make up the key components with regards to improving the marine environment. The document offers a collated view of where a target has been met or is yet to be achieved, where there are gaps in knowledge, and in the process created a platform for possible improvements in the processes. The collection of targets also enables us to take a step closer to defining good ecological or environmental status.

The next step in this process will be to send the findings of this study to the Arun & Western Streams Catchment Partnership for their discussion. Stakeholders can assess the likelihood of all targets being met within the predicted timelines, and from that, what are the required actions of each stakeholder and lead authority with regards to meeting these targets. There will also need to be discussions on the broad range of amber indicators and the three red indicators.

Some follow up questions that may help guide discussions include:

- Where no targets exist, can targets be set?
- Do inter-agency working groups need to be set up where targets overlap between different directives?
- Do current processes in place need to be refined?

6. References:

Catchment Data Explorer. Environment Agency. Accessed March 2017.

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