



Marine Conservation Areas & No-Take Zones

Marine Protected Areas/Reserves



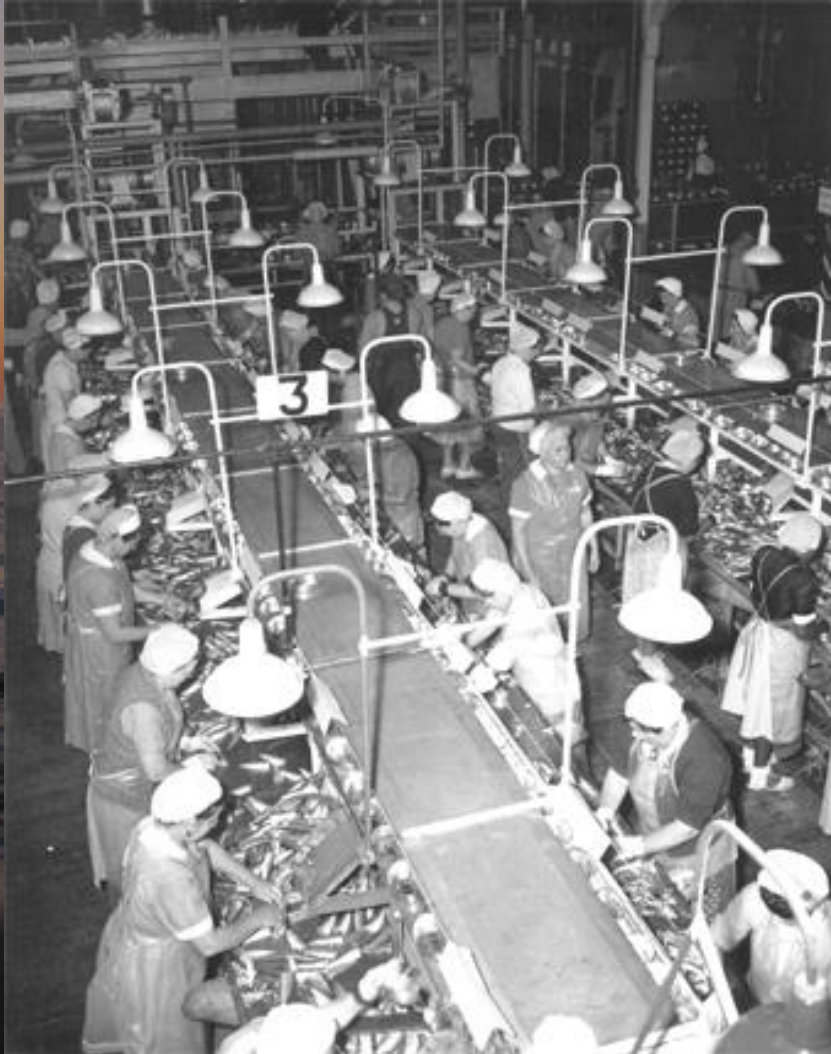
Why?

- Ecosystem functionality
- Climate Change
- Conserving cultural heritage
- Economics
- Biodiversity
- Resilience
- Enhancing fisheries
- Migratory species

Impacts of human activities

- No area in the global oceans is unaffected by man and 41% is strongly affected by multiple impacts
- North Sea & English Channel
- Two largest impacts are fishing and climate change (POST, 2008)

Monterey Bay



- WWI – demand for food
- Canned sardines
- Cannery Row – corrugated canneries lined the rocky shore
- From 75,000 cases in 1915 to 1.4 million in 1918

Monterey Bay

- Produced fishmeal
- Water pollution – waste was dumped in sea
- After WWII, sardines disappeared – efficient purse seine trawling
- Sea otters hunted for pelts (from a population of 16,000 in the 1700 to 50 in 1938)
- Kelp all but forest disappeared
- Dr Julia Platt (PhD in marine zoology – elected Mayor of Pacific Grove in 1931)

Monterey Bay



- Monterey Bay National Marine Sanctuary
- Marine protected area – kelp forests, offshore seamounts, deep water canyons – from shrimp to blue whales



- Designated in 1992 for its biological richness, unique habitats, threatened and endangered species and cultural relics.
- 6100mi² of ocean, 300 miles of coastline
- 34 species marine mammal; >95 seabirds; 525 fish species; 4 species turtle; 31 phyla invertebrate; >450 species marine algae

Managing Impact

- 8 million people live within 50 miles of the shoreline
- Coastal tourism
- Agriculture
- Commercial fishing

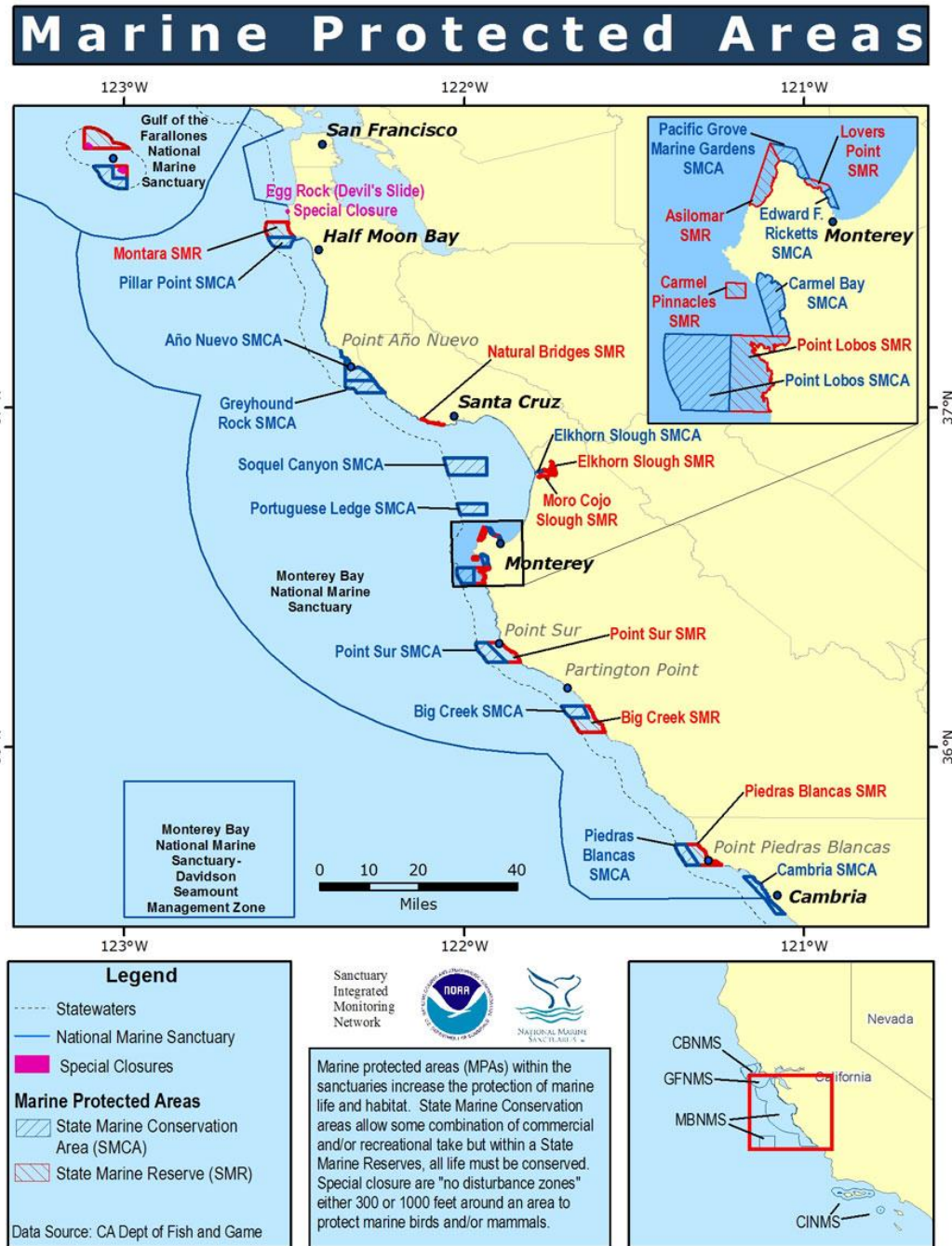


- Coastal erosion
- Harbour dredging
- Submerged cables
- Trawling impacts
- Non native species
- Water quality issues
- Wildlife disturbance

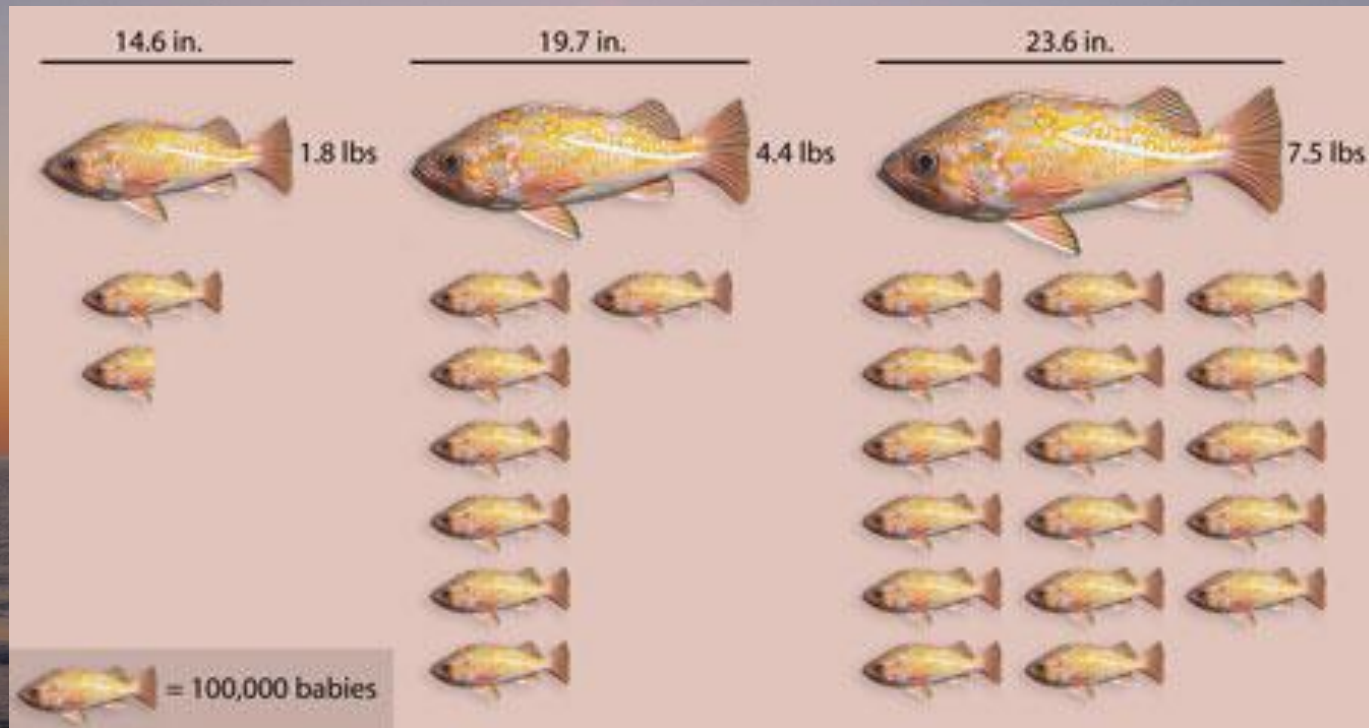


- Marine Protected Areas
- Long-term Monitoring programmes

- Curtailed activities:
 - Extraction of organisms (all fishing, kelp harvesting)
 - Mariculture
 - Impacting activities upon geological attributes – mining, effluent discharges
- Special Status Species Project:
 - Research
 - Education
 - Resource management project



Do no-take zones work?



Inside the MPAs, spiny lobsters have increased in abundance



International Requirements

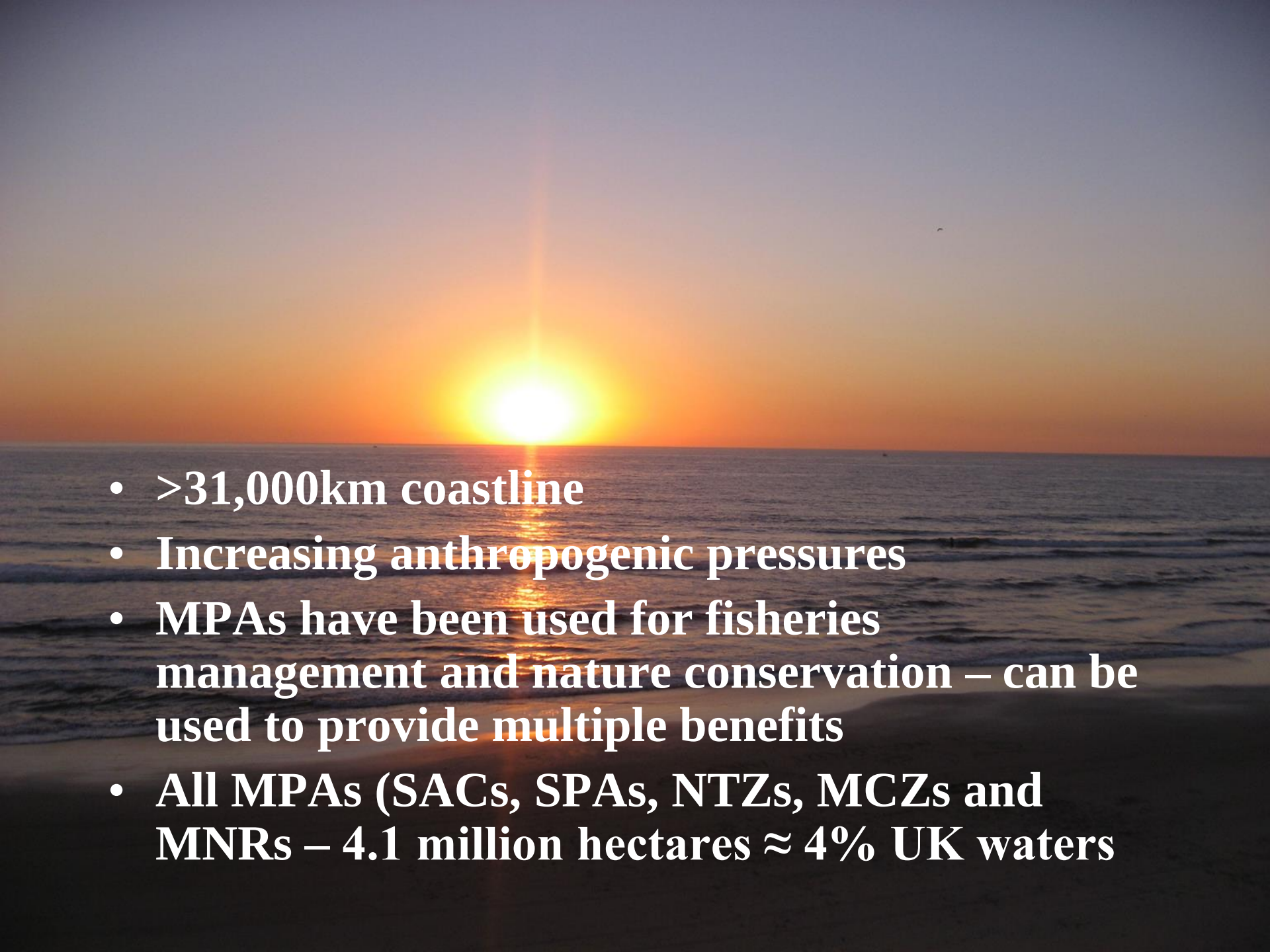
- “an ecologically coherent network of well-managed marine protected areas”

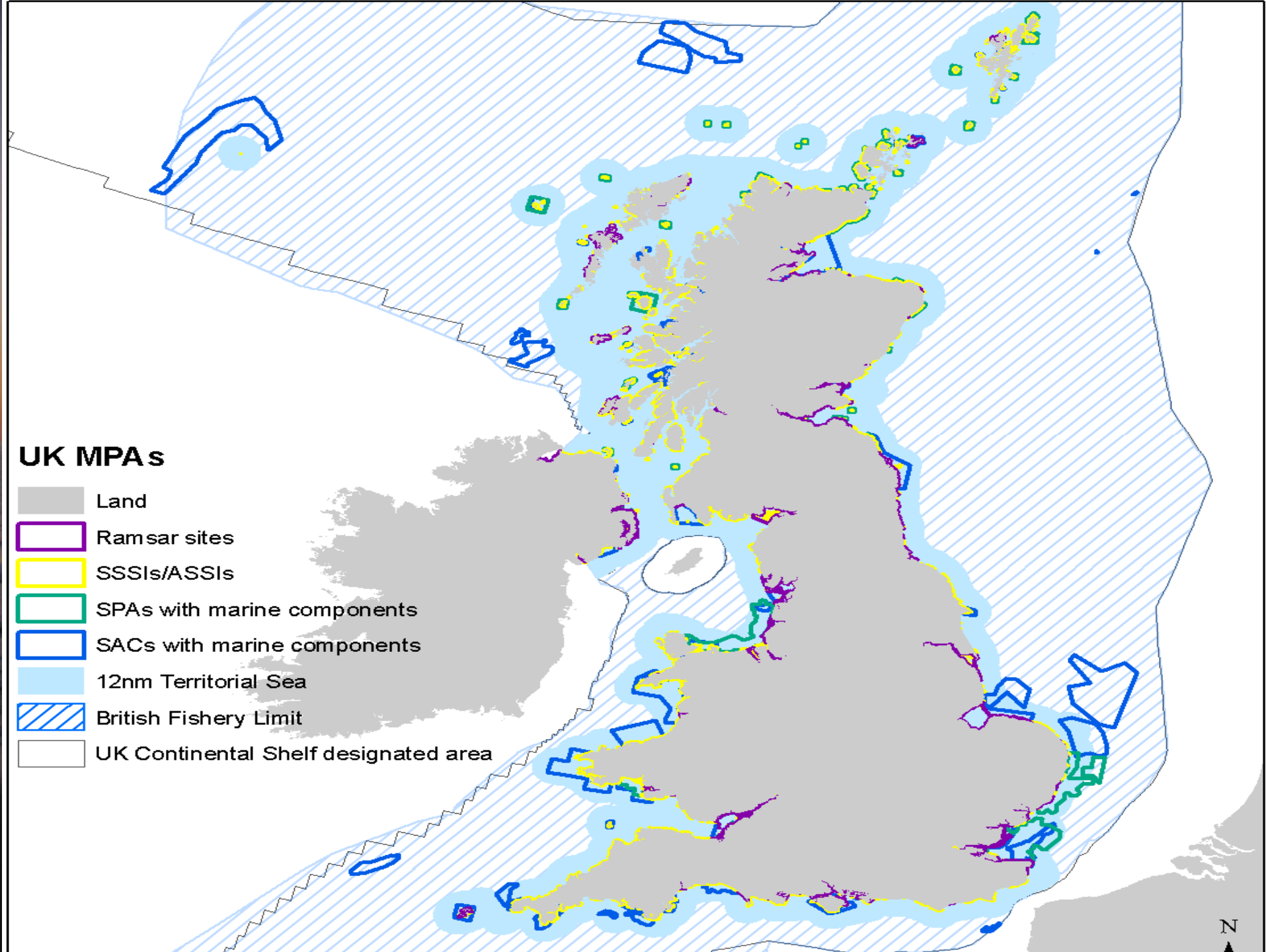
by 2012 under the
Convention on the
Protection of the Marine
Environment of the North-
East Atlantic (OSPAR)



Marine Protected Areas

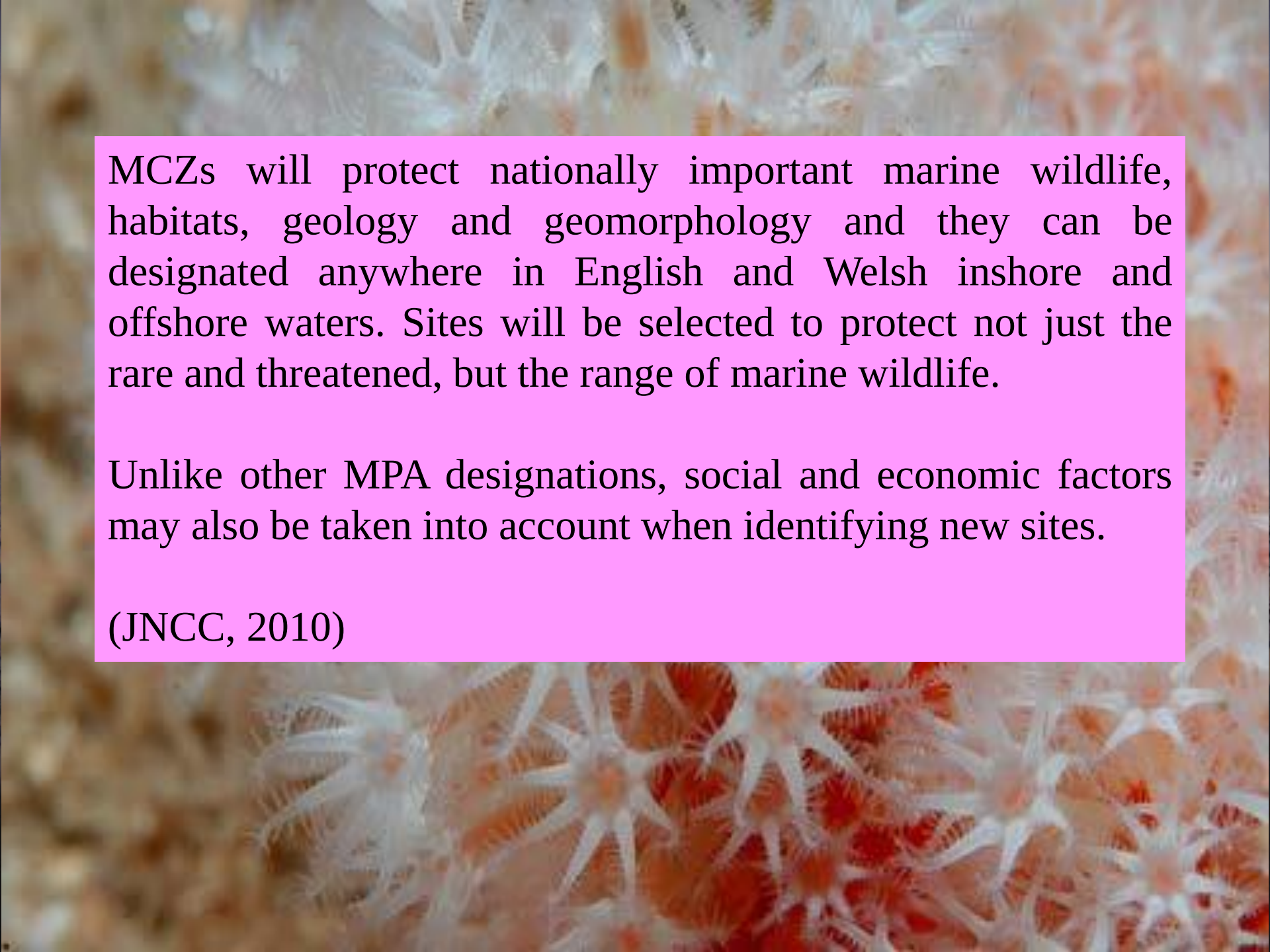
- “Areas where specific living and sometimes non-living resources are legally protected” (DEFRA, 2013:1)
- Activity restrictions
- Particular focus on species and habitats of European and national importance.
- 2 main types:
 - European Marine Sites (Natura 2000) – SACs and SPAs
 - Marine Conservation Zones (MCZs) – nationally important for certain species and habitats
- An ecologically coherent network of MPAs

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- A photograph of a sunset over the ocean. The sun is a bright, glowing orb on the horizon, casting a long, shimmering reflection across the water. The sky is a gradient of colors from deep blue at the top to orange and yellow near the horizon. The water is dark with some white-capped waves visible in the distance.
- **>31,000km coastline**
 - **Increasing anthropogenic pressures**
 - **MPAs have been used for fisheries management and nature conservation – can be used to provide multiple benefits**
 - **All MPAs (SACs, SPAs, NTZs, MCZs and MNRs – 4.1 million hectares $\approx$ 4% UK waters**



Levels of Marine Protection

- Special Areas of Conservation (SACs) are required by law under the European Habitats Directive
- Special Protection Areas (SPAs) are required by law under the European Wild Birds Directive.
- Collectively, they are known as European Marine Sites (EMS)
- Ramsar sites are designated under the Convention on Wetlands of International Importance 1971.
- Sites of Special Scientific Interest (SSSIs) notified and managed under the Wildlife and Countryside Act 1981
- Marine Nature Reserves (MNRs) designated under the same legislation as SSSIs – Marine & Coastal Access Act (2009) has allowed the conversion to Marine Conservation Zones - Lundy



MCZs will protect nationally important marine wildlife, habitats, geology and geomorphology and they can be designated anywhere in English and Welsh inshore and offshore waters. Sites will be selected to protect not just the rare and threatened, but the range of marine wildlife.

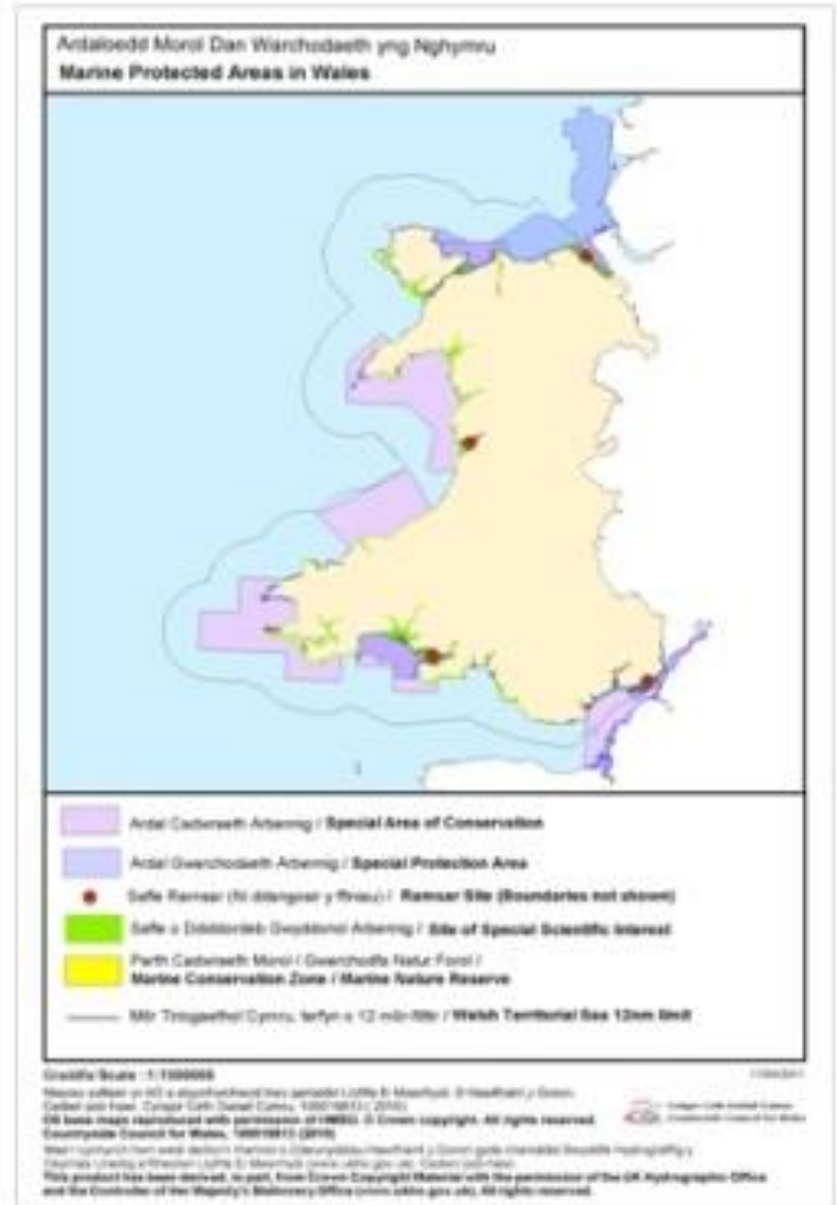
Unlike other MPA designations, social and economic factors may also be taken into account when identifying new sites.

(JNCC, 2010)

EMS Progress - England

- 94 SACs with marine components
- 107 SPAs with a marine component for birds
- Almost 25% England's inshore waters protected in EMS
- JNCC responsible for identifying offshore sites
- Natural England – inshore
- Manage commercial fisheries in EMS!

- 36% Welsh waters have a designated MPA
- However, failure to manage MPAs Welsh waters have seen 50% EMS fail to reach their favourable conservation status

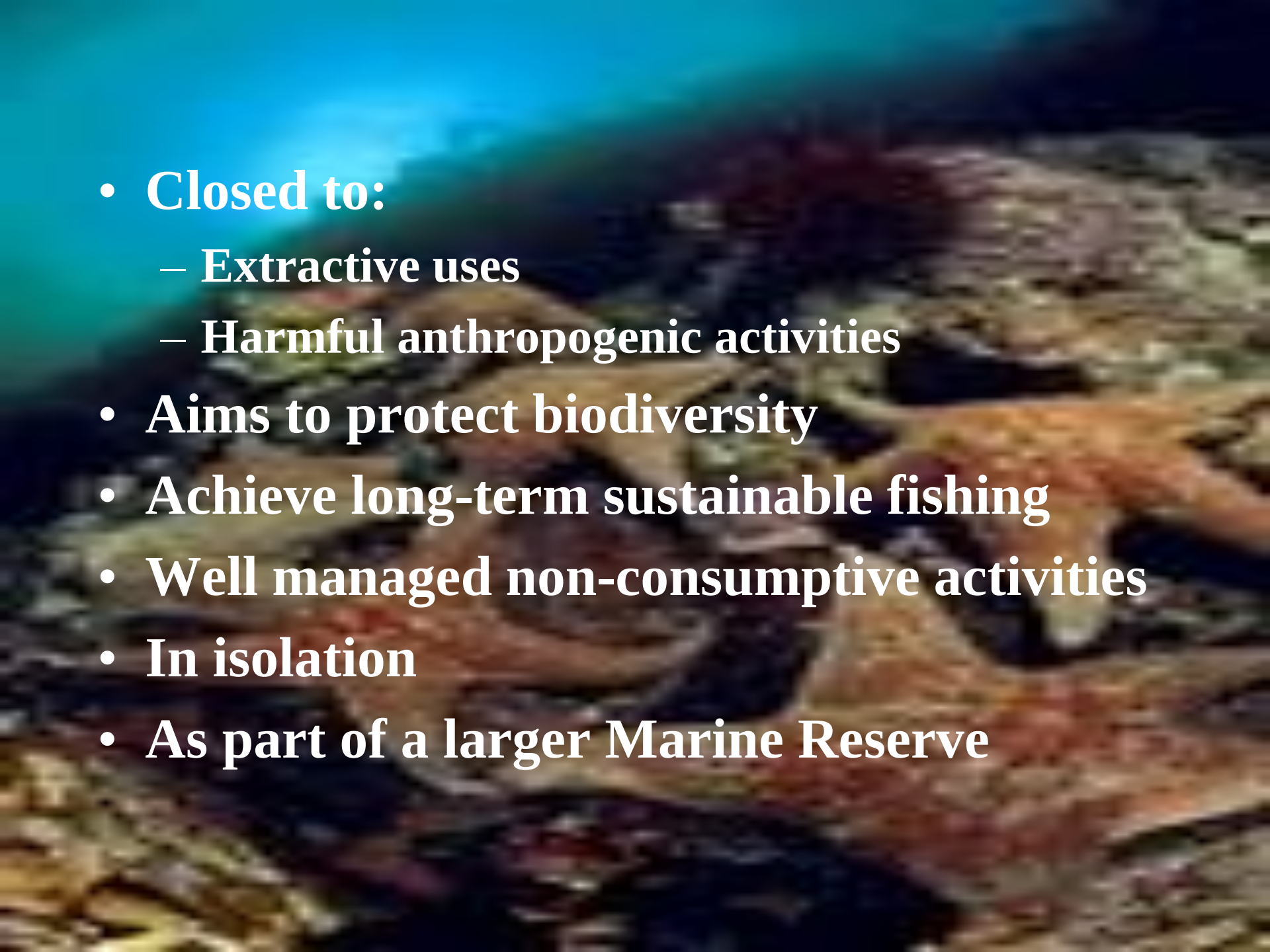


What is a No Take Zone (NTZ)?

- **“An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”**

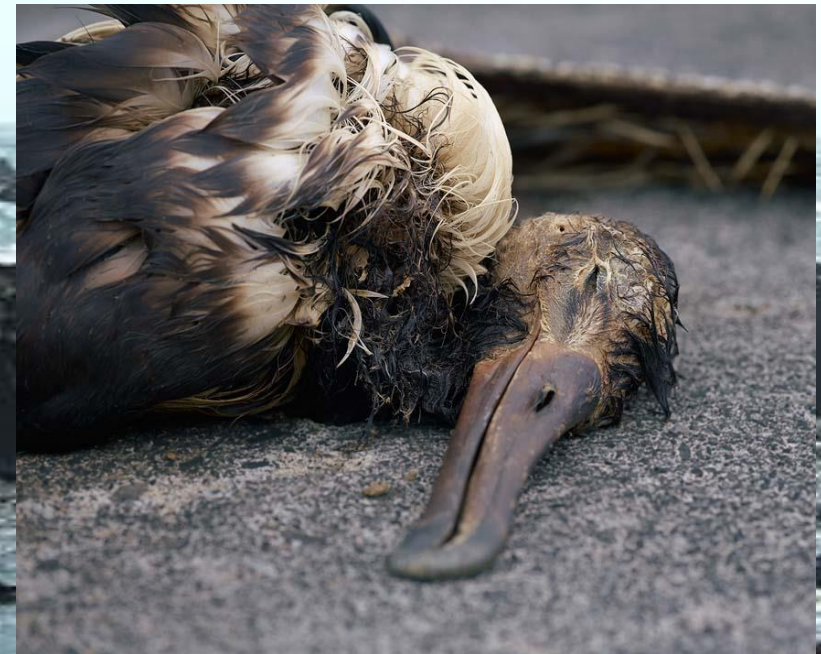
(IUCN, 1994:4)

- **0.01% British waters are ‘no-take’ zones**
- **Royal Commission on Env Pollution recommending 30% in 2004**

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- The background of the slide is an underwater photograph of a coral reef. The water is a deep blue-green, and the coral structures are visible in various shades of brown, orange, and purple. The lighting is somewhat dim, creating a serene and naturalistic atmosphere.
- **Closed to:**
 - **Extractive uses**
 - **Harmful anthropogenic activities**
 - **Aims to protect biodiversity**
 - **Achieve long-term sustainable fishing**
 - **Well managed non-consumptive activities**
 - **In isolation**
 - **As part of a larger Marine Reserve**

Benefits of No-Take Zones

- **Ecosystem resilience**
- **Species Diversity
Biomass & Abundance**
- **Body size**
- **Larger fish &
invertebrates = more
young**



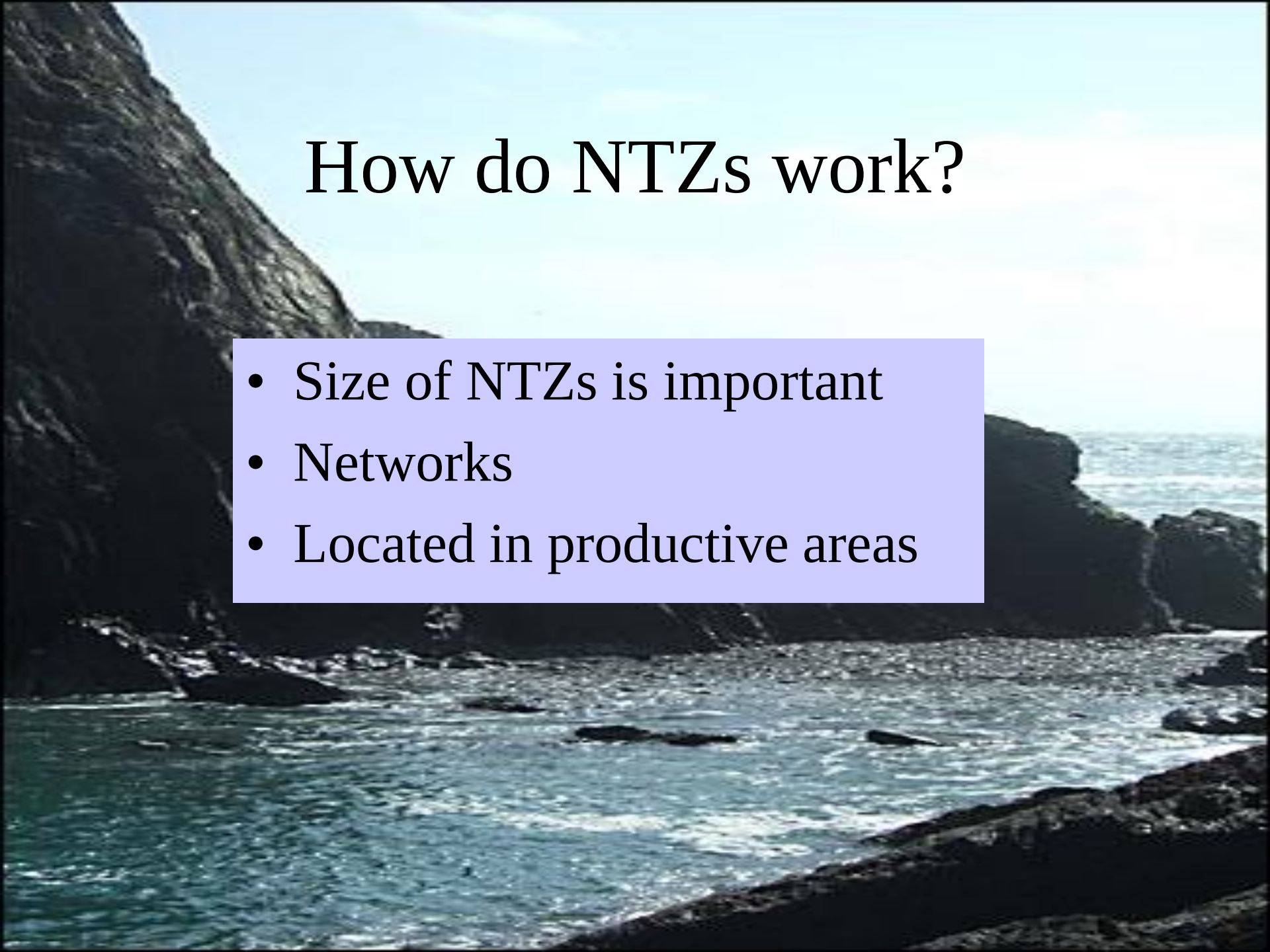
Benefits

- Conservation of habitats
- Prevention of over-fishing
- Protection of many other species
- Larval dispersal
- Supplementary migration
- Insurance against uncertainty
- Tourism!



How do NTZs work?

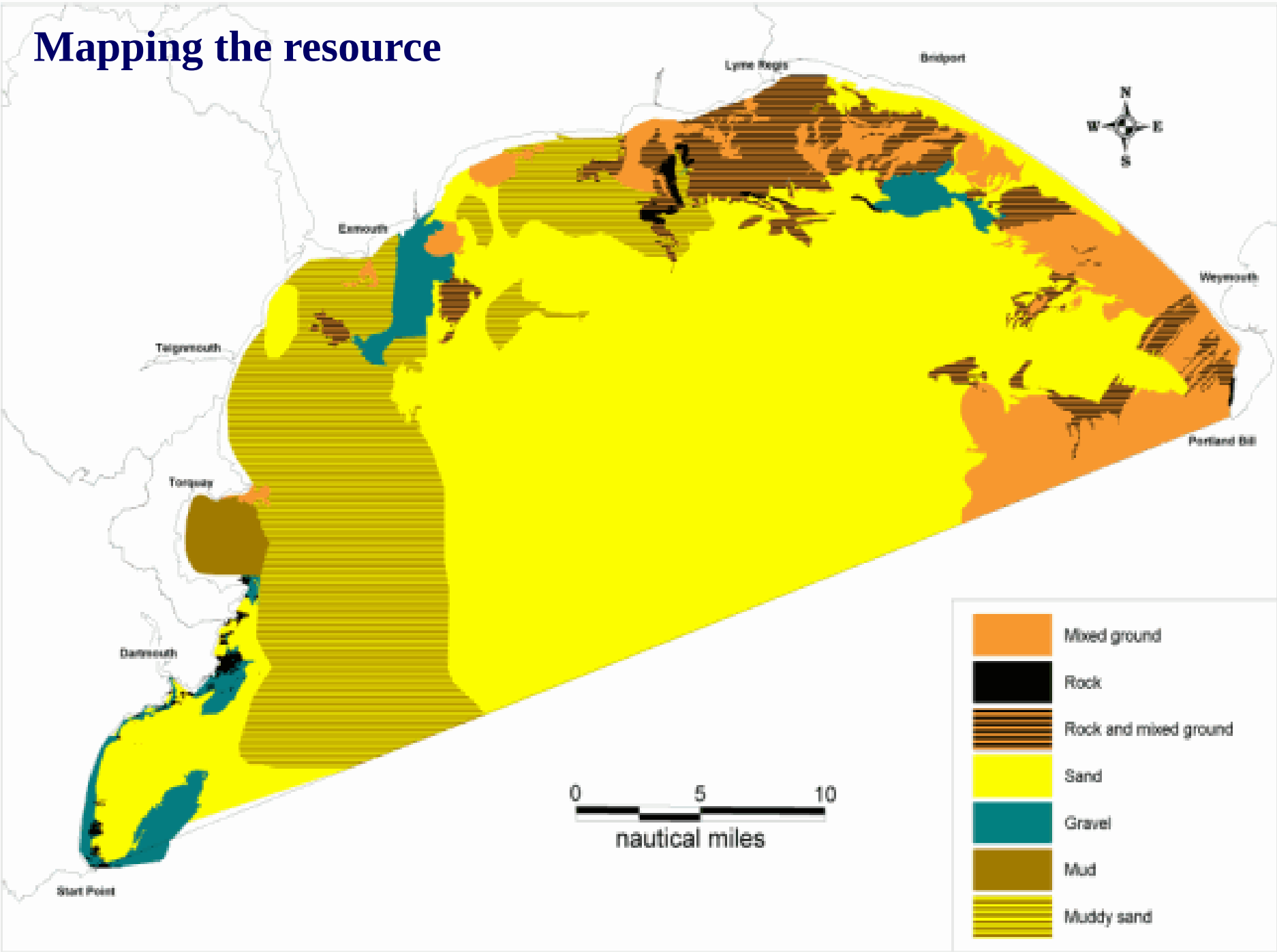
- Size of NTZs is important
- Networks
- Located in productive areas



How Marine Reserves are chosen

- **Identifying bioregions** – patterns in biology, oceanography & physical coast/seabed characteristics
- **Identifying candidate marine protected areas** – based initially on capacity to represent biodiversity
- **Community Consultation** – environmental & socio-economic
- **Zoning** – variable protection depending on resilience of that site

Mapping the resource



Great Barrier Reef

- **Managed by the Great Barrier Reef Marine Park Authority**
- **4 themes:**
 - **Ecosystem level**
 - **Conservation & reasonable use**
 - **Public participation**
 - **Monitoring and performance evaluation**

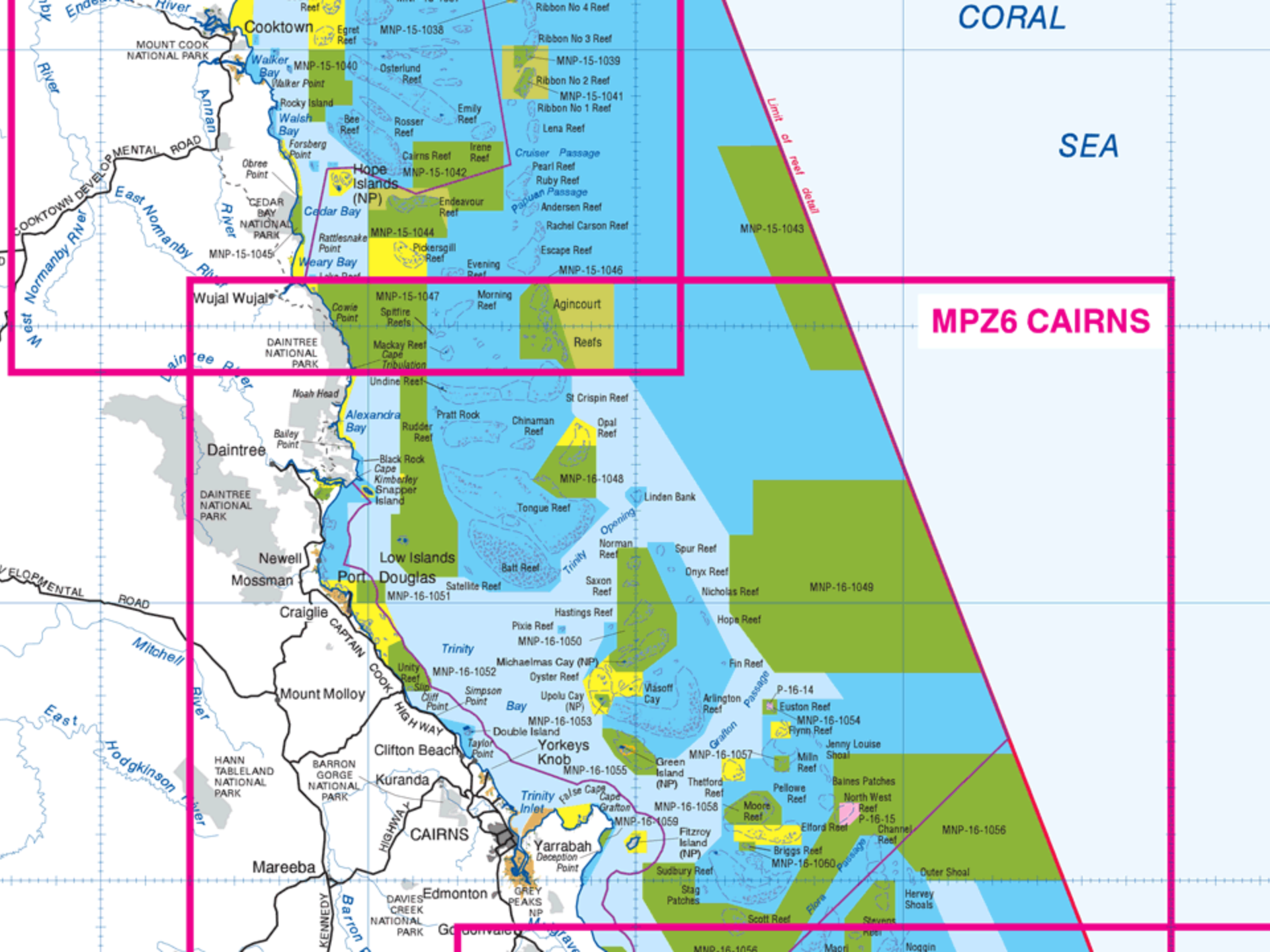


GBR - Zoning

- **Zones are according to vulnerability & conservation importance:**
 - **PINK Zones of SANCTUARY Zones** – highest protection
 - **GREEN Zones or NO TAKE Zones** – 4.5%
 - **GENERAL USE Zones** - buffers

SEA

MPZ6 CAIRNS



What is the NTZ for? Biodiversity conservation/fisheries management or both?

- Australia & NZ – purely biodiversity conservation
- Fisheries benefit – an added value
- Most fisheries – against NTZ use for mmgt
- Less pressure on resources and fewer competing countries
- TACs
- Marine zoning and catch controls preferred
- Compensation



Options?

1. Reserves that are entirely NTZs
 2. Zones – with NTZs & general use zones
- Temporary or Permanent?
 - Compliance?



Effects on commercial species

- Densities of snapper *Lutjanus campechanus* 15% higher in NTZs
- 4 times more spiny lobster *Jasus edwardsii* (Tonga Island Reserve)
- Rock lobster *Jasus lalandii* increasing in size and number by 7% per year (DoC, 2005)



Lundy Island

- England's first marine conservation zone (2010)
- No Take Zone – east coast
- First legally enforced no fishing area (2003)
- 4km² – variety of habitats and species
- Some nationally important
- Lobsters and scallops



Why is Lundy so special?

- Geology – seabed rocky
- Filter feeding species – sponges, anemones, stony & soft corals
- Productive seas – tide-swept waters of Bristol Channel
- Sits between boundary of cold Boreal and warm temperate

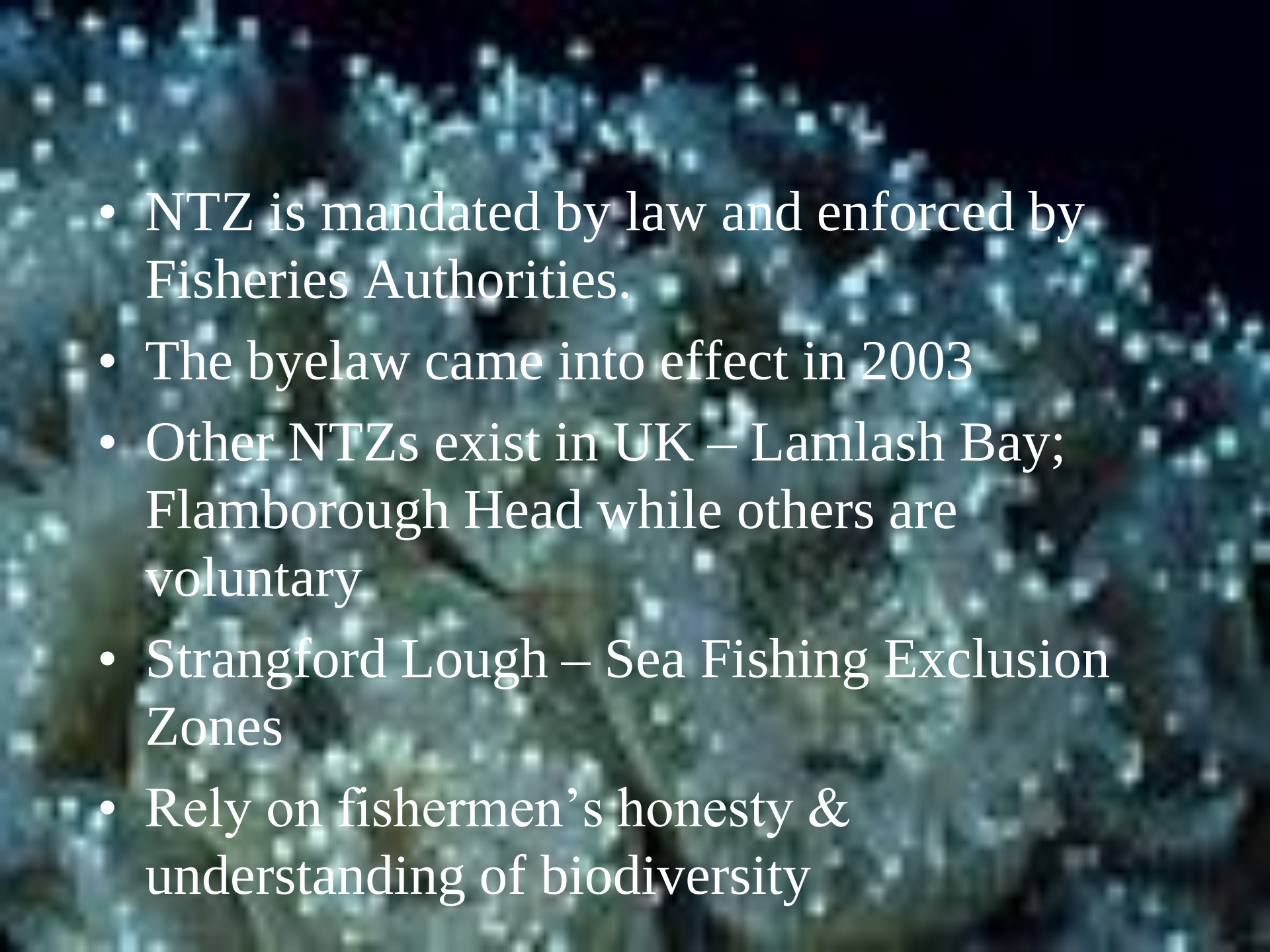
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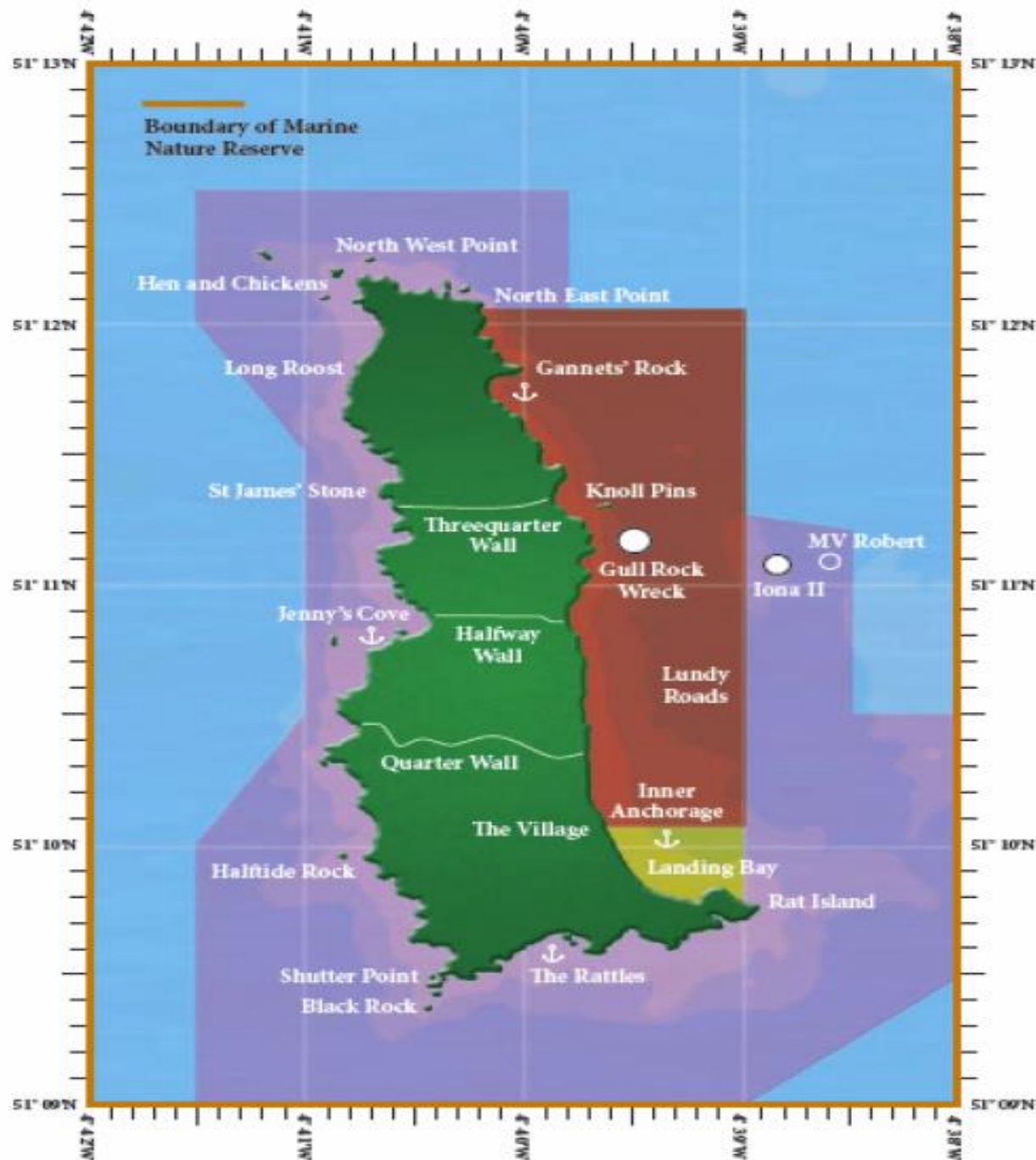
- Effective breakwater
- Different plants & animals
- Sunfish and Basking sharks
- Breeding site for grey seals
- Seabirds – razorbills, kittiwakes, Manx shearwaters and guillemots

Conservation Designations

- SSSI
- Britain's first Marine Nature Reserve (1986)
- SAC
- NTZ – a form of Marine Protection Area



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- NTZ is mandated by law and enforced by Fisheries Authorities.
 - The byelaw came into effect in 2003
 - Other NTZs exist in UK – Lamlash Bay; Flamborough Head while others are voluntary
 - Strangford Lough – Sea Fishing Exclusion Zones
 - Rely on fishermen's honesty & understanding of biodiversity



KEY

- **No Take Zone**
No fishing or collection of sea life of any kind.*
No anchors or diver shotlines within 100m of the Knoll Pins.
- **Refuge Zone**
No fishing except potting or angling.
- **Recreational Zone**
Restrictions as for Refuge Zone but be aware of other water users.
- **General Use Zone**
No spear fishing.
- **Archaeological Protection Zones**
No diving or fishing allowed (without a licence^).
- ⚓ **Recommended Anchorages**
In the Landing Bay please allow clear access for the ferry.

* Devon Sea Fisheries Committee byelaw.

The No Take Zone stretches

Benefits of NTZ to Lundy

- Preserving marine environment for future
- Reduce fishing impacts – dredging
- Spill-over
- Nursery ground
- Tourism and educational opportunities



What is currently being monitored at Lundy?

- Lobster *Homarus gammarus*, brown crab *Cancer pagurus*, spider crab *Maja squinado*, velvet crab *Necora puber*
- Scallops *Pecten maximus*
- Rock epifauna – Sponges *Porifera spp.*, Corals & anemones *Cnidarians spp.*, sea squirts *Ascidians spp.*, starfish & sea urchins *echinoderms spp.*

Pink Sea Fan *Eunicella verrucosa*

Also dead men's fingers *Alcyonium digitatum* and trumpet anemone *Aiptasia mutablis*

How is it being monitored?

- Baited traps for sampled lobster etc
- Within NTZ and at other control sites
- Potted daily for 5 consecutive days
- Specimens counted and measured for size
- Scallops and epifauna - divers

published in the ICES Journal of Marine Science compared a fished area to an eight year old, unfished, no-take zone (NTZ) in the Lundy Island MPA, and found that although lobsters were more abundant, and larger in the NTZ, they were also more likely to be injured.

It was found that lobsters caught in the unfished area were 71% more likely to be injured than lobsters in the fished area, which could be a result of overcrowding resulting in competition and fighting in these highly territorial animals. In conjunction, if a lobster was found to be injured, it was 76% more likely to have shell disease than an uninjured animal, regardless of where it was caught.

Dr Davies said: "It has always been assumed that MPAs are the solution for conservation, with increased catch, and overspill into adjacent fisheries helping to replenish overfished stocks and enhance recruitment. Our study is interesting in that it introduces the idea that un-fished populations in marine reserves may eventually reach a threshold at which conditions become unhealthy. This may even introduce the possibility of controlled fishing in long-standing no take zones."

Lundy Island was the first Marine Nature Reserve, NTZ and Marine Conservation Zone in UK waters and was implemented with no baseline monitoring in terms of disease and population health. (Swansea University, 2015)



Scotland – time closures

- Voluntary time closure from Sept 2007
- Protecting concentrations of cod
- Common Fisheries Policy – days at sea quotas

A close-up photograph of a young, fluffy white bird, possibly a chick, sitting on a nest. The nest is constructed from dark, jagged rocks and some dry twigs. The chick has a dark, round eye and a small, dark beak. It is looking directly at the camera. The background is out of focus, showing more of the nest and some green foliage.

Not a cure for all
fisheries management

Valuable tool – attached
shellfish and finfish
populations

Coastal Developments – potential for marine protection?



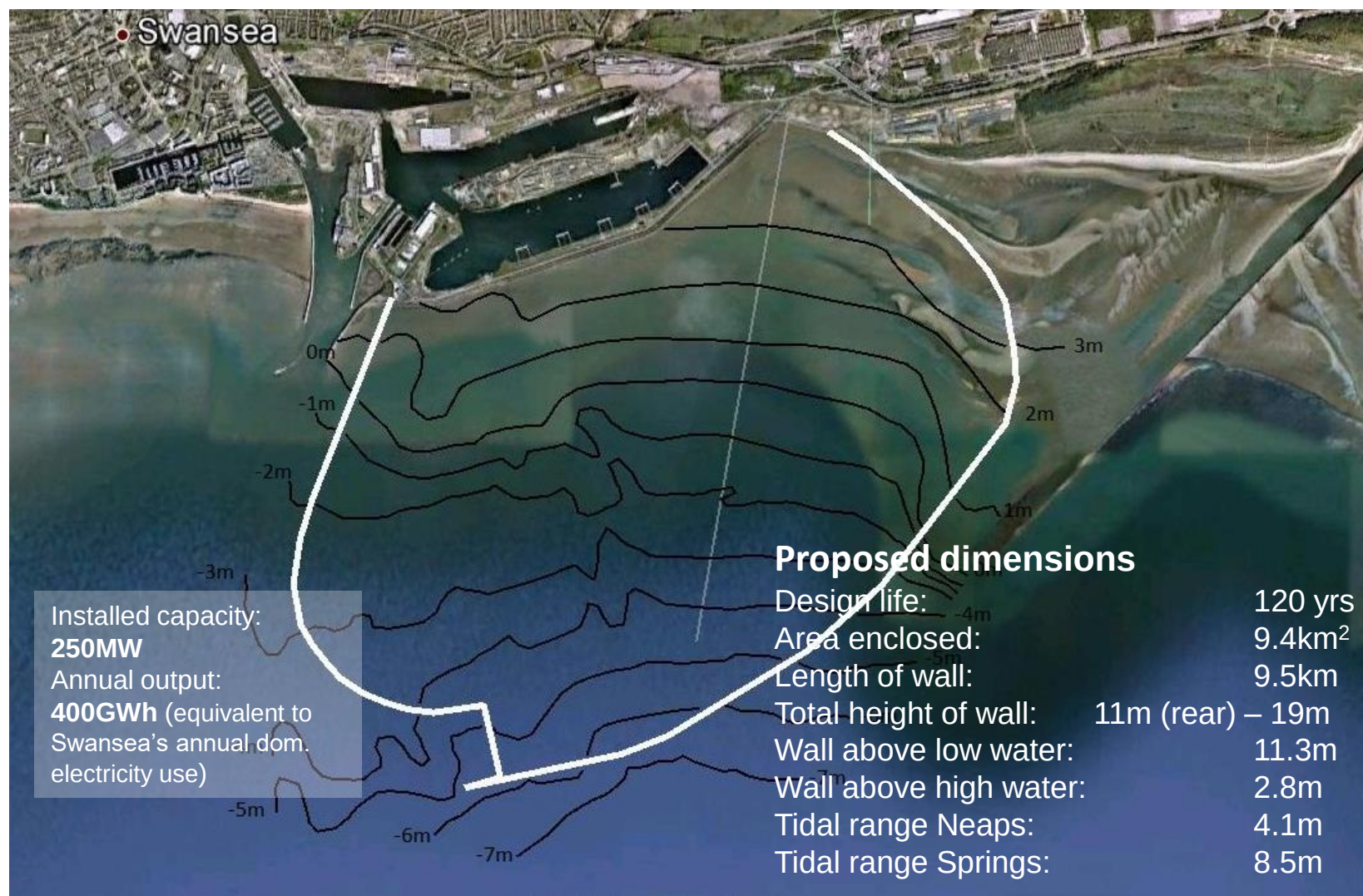
Artist's Impression

Why a Tidal Lagoon?

- Low cost, renewable source of energy
- Sixteen power stations are coming to the end of their lives between now and 2023, representing a quarter of the UK's total generating capacity.
- Since tides are predictable and reliable they can offer the first fully renewable form of electricity that can meet minimum consumer energy demands in the UK (baseload) without the need for 'topping up' with electricity produced from fossil fuels.



Swansea Bay Lagoon – Scoping Report



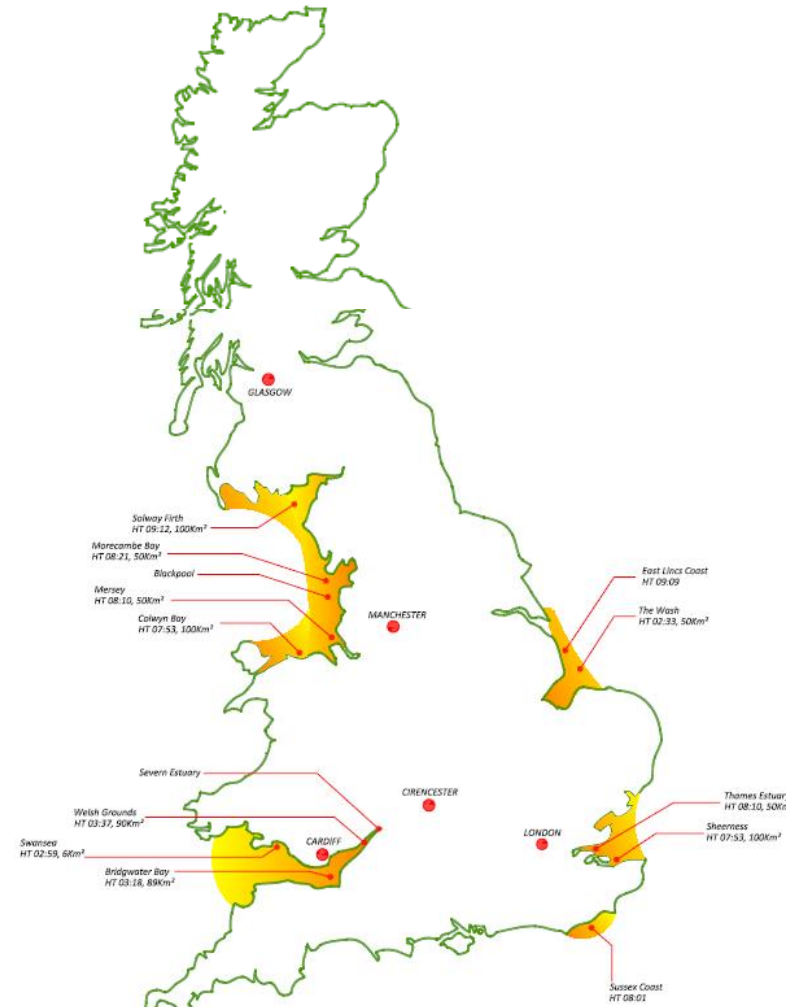
The UK's Tidal Range Resource

The necessary conditions for building tidal lagoons are:

- Shallow water
- Large tidal range

The areas marked in orange on the map hold those general characteristics.

The difference in high tide around the UK represent the potential to produce base load electricity around the clock from a reliable renewable resource.

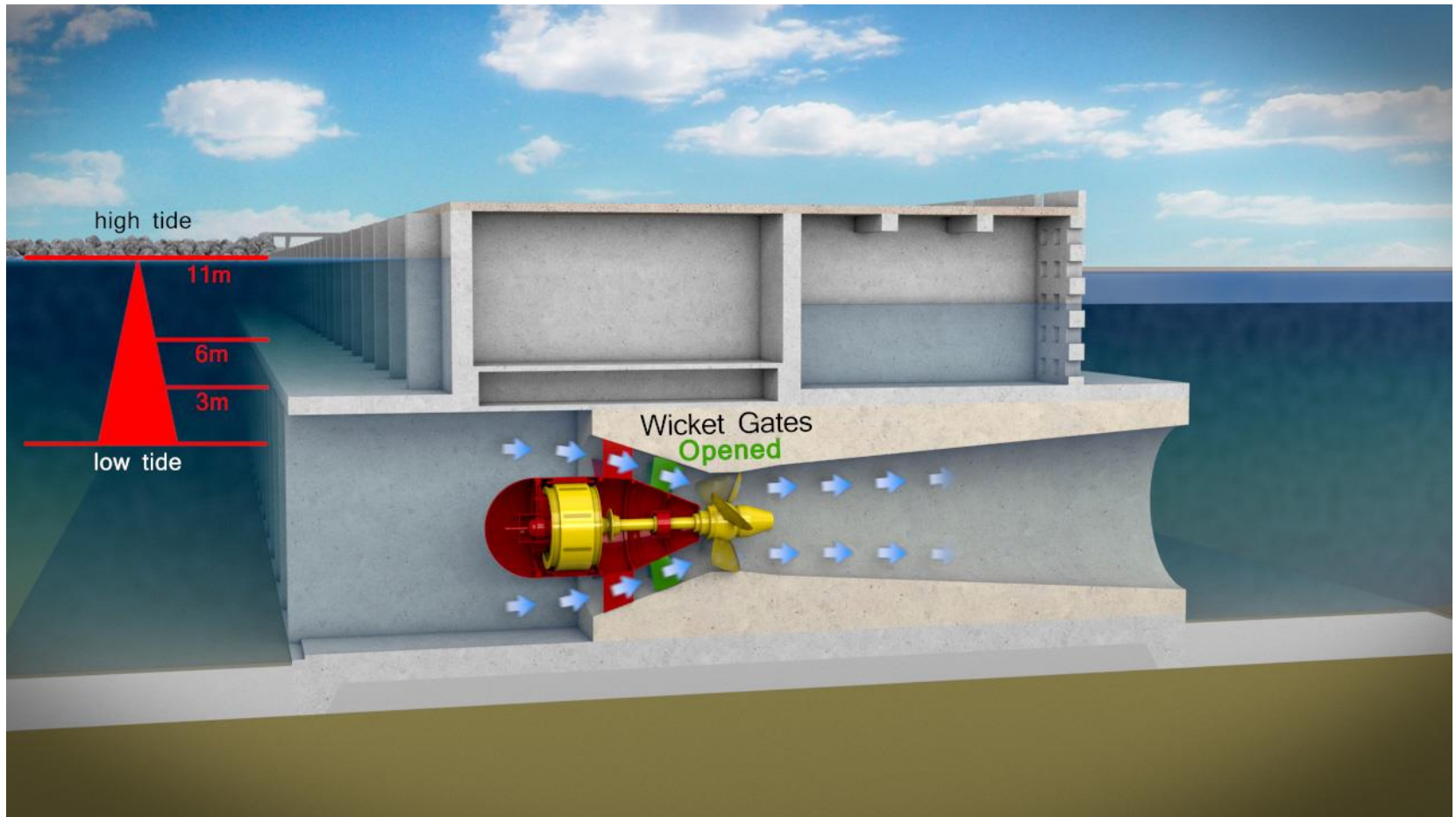


The Severn Estuary

The Severn Estuary offers high tidal range and a number of suitable lagoon sites.



Swansea Lagoon Operation



Wildlife impacts: Student self-study

- Consider the development of the lagoon. What potential impacts and/or benefits are there likely to be on fish, seabirds and marine mammals within Swansea Bay.
 - Consider the construction phase and the operational phase
 - Change in sediment levels, noise and collision potential may all be looked at.
 - When complete there will be an exclusion zone and artificial reef environment – so what benefits might we see?
 - For discussion after Easter and in revision session

