



SW Partnership for Environment & Economic Prosperity

SWEEP019

Water quality management underpinning sustainable aquaculture

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UNIVERSITY OF
PLYMOUTH
Marine Institute



PML | Plymouth Marine
Laboratory

- Placing natural capital at the heart of business & policy decision making
- Delivering transformative regional impact from NERC environmental science
- Five year programme of multidisciplinary activities integrated across all environments

Restore
natural capital
for economic &
social benefit



Mainstream
natural capital in
public and private
decision-making



Integrate
policymaking for
natural capital-
led growth



Safeguard
natural capital
to increase
resilience



Boost the
business sector:
new markets for
natural capital



Safeguarding natural capital to increase resilience



Reduce economic & societal impacts of coastal hazards

Network Rail, EA, RNLI, Met Office



Leak detection using landscape modelling and drone thermal imaging

South West Water



Sustainable drainage systems

Pell Frischmann, Welsh Water, Jacobs, South West Water

Restoring natural capital for economic and social benefit



National Parks - use of natural capital approaches

Dartmoor & Exmoor National Parks, Clinton Devon Estates, Duchy of Cornwall, RSPB



Managing green space for pollinators and people

Kier, Riviera Produce, Defra, Cornwall Council, Buglife, NFU, Duchy, NE, FWAG.



Environmental health: Targeting environmental investment for health and wellbeing

Rockefeller Foundation, Public Health Cornwall, EA, Devon LNP, North Devon GP Consortium



One Coast: Developing a South West corridor for nature and people

National Trust, RSPB, SW Coastal Path

Integrated policymaking for natural capital-led growth



Implementing the 25 Year Environment Plan (1): The Landscape Pioneer

Defra, Natural England, EA, NFU



Implementing the 25 Year Environment Plan (2): The Marine Pioneer

Defra, MMO, IFCA, North Devon Council



Strengthening the science underpinning of the South West Marine Plan

Marine Management Organisation (MMO)



Mainstreaming delivery of Cornwall's Environmental Growth Strategy

Cornwall Council, LNP & AONB, NE, Wildlife Trust

Mainstreaming natural capital into private & public decision making



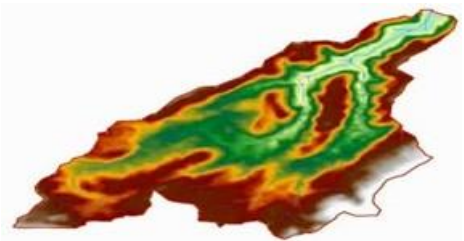
Using NEVO to support Environmental Land Management

Defra, National Parks



**Landscape design and decision making:
Novel remote-sensing tools for
profitable and sustainable landscapes**

*NE, EA, Dartmoor, Turing
Institute, Forestry Commission,
UNESCO North Devon
Biosphere*



**A geospatial decision support system
for water quality interventions**

*NE, EA, Westcountry Rivers
Trust, National Trust, Forestry
Commission, SWW*

Boosting the business sector



Building policy and business opportunities for pollinator management in the SW and beyond

Natural England, Duchy of Cornwall, Farming and Wildlife Advisory Group



Delivering natural capital assessment tools for the marine economy

MMO, WWF, Natural England, Defra, UNESCO North Devon Biosphere



Whole catchment water management

South West Water, EA, Wildlife and Rivers Trusts, National Trust

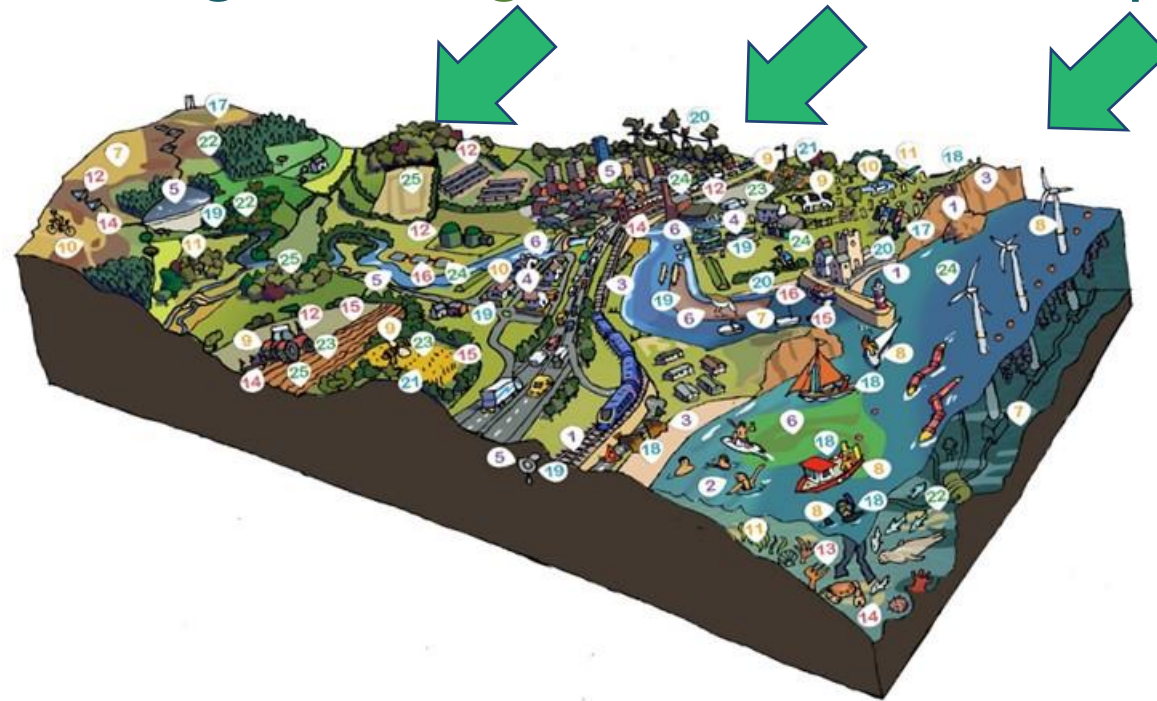


**SWEEP019:
Water quality management for sustainable aquaculture**

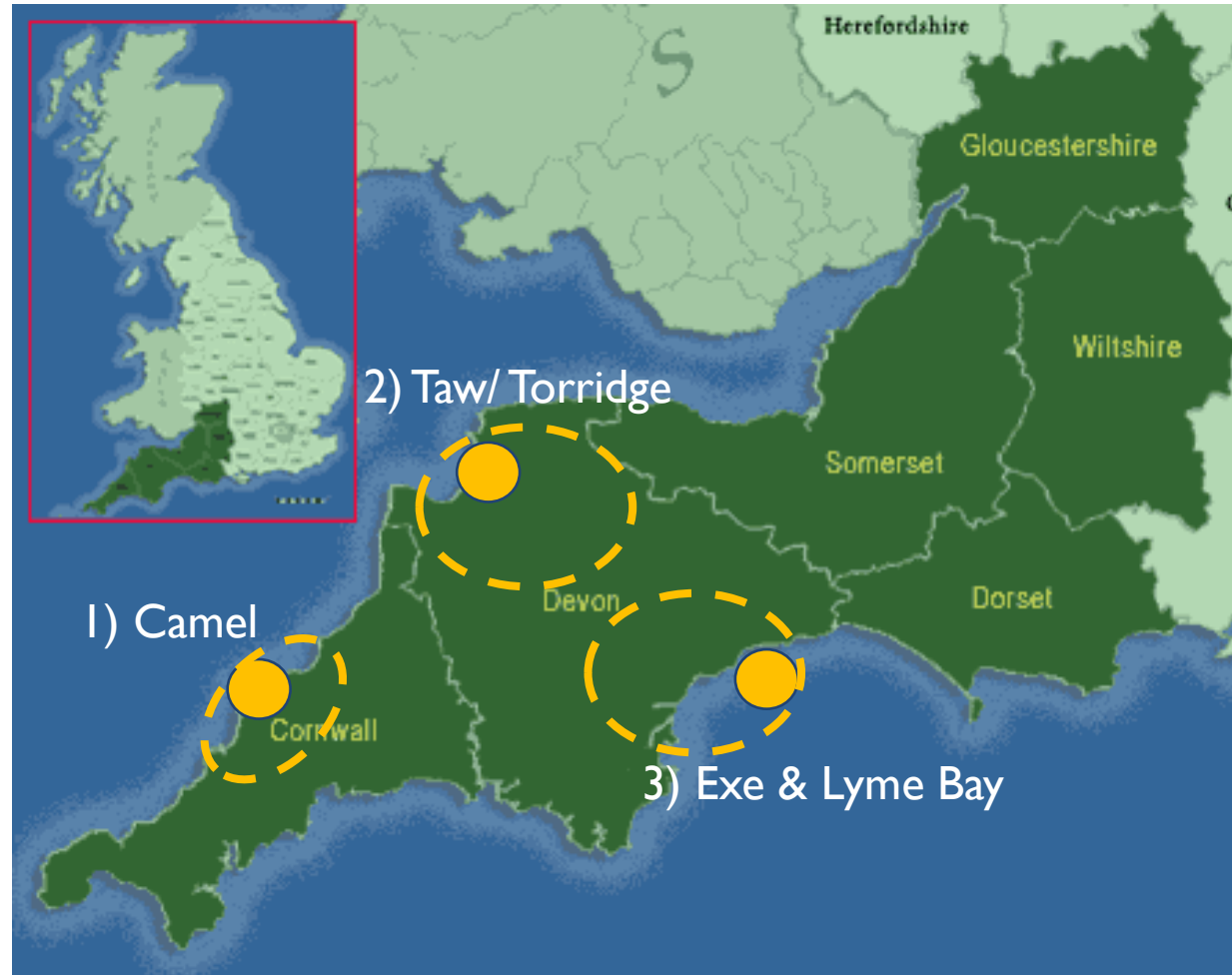
Seafish Industry Authority, Cefas, Shellfish Industry, MMO, SWW, EA

SWEEP019 Project challenge – understanding & managing dependencies of SW aquaculture on water quality (& vice versa)

- Shellfish aquaculture - sustainable food production
- Requires good water quality (nutrients, chemicals, pathogens) via...
- Holistic resource management: agriculture, water & aquaculture sectors



SWEEP019 Case studies on SW catchments linked to estuarine and coastal shellfish production sites



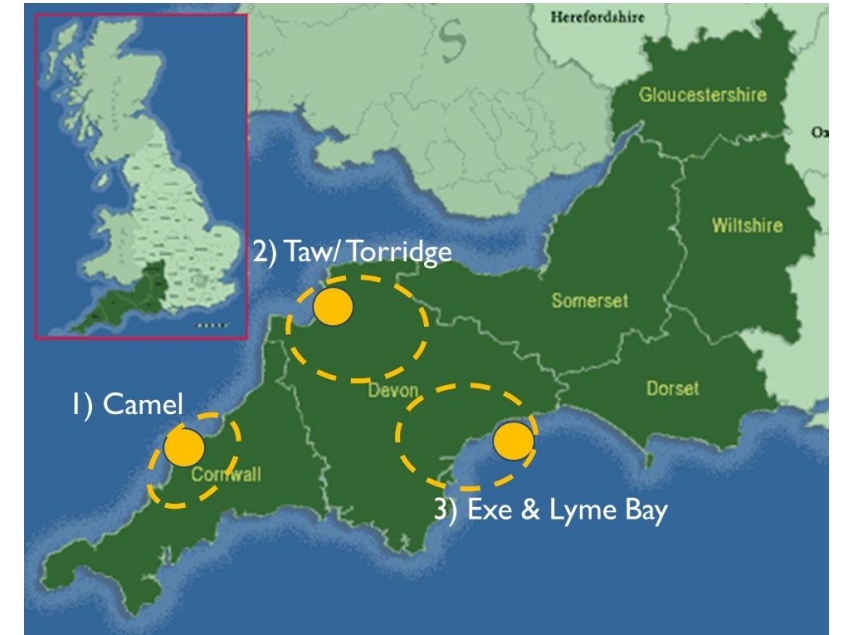
Task 1: Review SW shellfish sites

- Review currently licenced and defunct shellfish aquaculture installations
- Establish decision process for siting at these locations
- Review level of success in production and reasons (where appropriate) for failures/closures



Task 2 : Water quality appraisal for selected catchments

- Evaluate water quality (WQ) at shellfish sites:
 - Camel estuary
 - Taw/Torridge estuaries
 - Exe estuary and Lyme Bay
- i.e. sites with different catchments and anthropogenic pressures on WQ (nutrient, chemical & microbiological)
- Trace pollution sources using satellite and field data



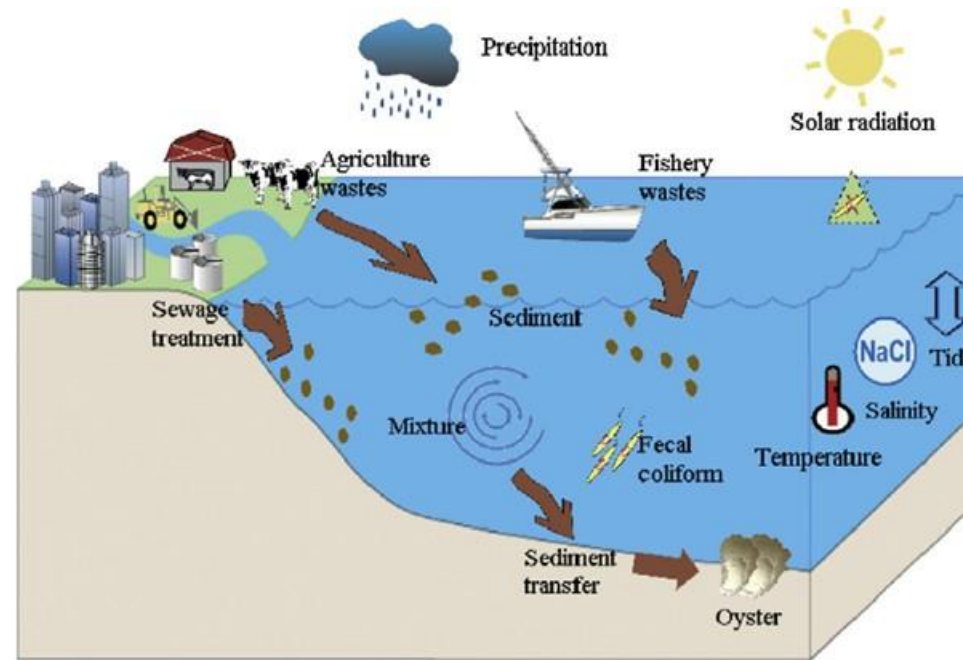
Task 3: Link water quality to existing land use

- Predict WQ based on land use and verify using data from (Task 2)
- Evaluate land use e.g. fertiliser (incl. sewage & manure), pesticide application & WQ through the catchment.
- Evaluate the environmental and economic benefits of different land use Natural Environment Valuation (NEV)



Task 4: Link water quality to shellfish quality & biomass

- Relate shellfish biomass and quality to WQ using
 - Production functions
 - ShellSIM model (<http://www.shellsim.com>)
- Establish +ve and –ve influences of shellfish upon WQ.... incl.
- Bio-remediation potential - indication of nitrogen and carbon capture
- Evaluate environmental carrying capacities for cultured shellfish



Task 5: Link water quality to future land use

- Simulate future land management scenarios and impacts on WQ affecting shellfish quality & quantity
- Account for projected land use change, population growth & climate change
- Quantify the ecological and economic impacts of deteriorating WQ (versus the benefits of maintenance or improvement).



Task 6: Facilitate strategic aquaculture development planning

- Build an holistic spatial view of WQ pressures: estuaries - offshore
- Consider other factors constraining SW aquaculture expansion
- e.g. wave exposure, accessibility, infrastructure & operational costs, external planning constraints (e.g. dredging, shipping, power generation etc.)



SWEEP019 Launch Event at University of Exeter (Streatham)

- Date: May/June
- Hosted by
- SWEEP www.sweep.ac.uk and
- Sustainable Aquaculture Futures
<https://www.exeter.ac.uk/saf/>



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