System for bathing Water quality
Modelling: SWIM (IVA5032)
Local aspects and project legacy
AFBI (2006) merging of DARD Science (1921) + ARINI (1926)

- Veterinary Science
  Belfast and Omagh

- Belfast - HQ

- Research Farm
  Hillsborough

- Aquatics

- Grass/Horticulture outstations

- Non-Departmental Public Body (NDPB)
- Total of 630 staff
- Funding:
  60% government
  40% competitive
What AFBI does:

- Research & Development
- Emergency Response
- Specialist Advice
- Diagnostic & Analytical
- National Reference Lab
Interreg

- System for bathing Water quality Modelling - SWIM
- Shared Waters Enhancement and Loughs Legacy - SWELL
- Collaborative Oceanography and Monitoring for Protected Areas and Species - COMPASS
- Collaborative Action for the Natura Network - CANN
- Source to Tap
- CatchmentCARE
- ALICE
- WaterPro
- Bryden Centre
SWIM Objectives

- The SWIM project: enable short-term pollution to be predicted, **bathing water quality prediction model** public information, media channels & electronic signage at beaches.

- This will help to protect **public health**, significantly improving communication with the public, and in doing so, contribute to promoting tourism.


- Aid identification and understanding of mitigating actions for social and ecological benefits in the event of pollution (Bathing Water Directive), where water quality is defined in E. coli and IE concentrations facilitating **discounting of predicted failures**.

- Develop prediction models for 6 Beaches NI and 2 ROI (Legacy).
SWIM Work packages

- WP T1: Establishment of Historical meteorological/hydrological data inventory.
- WP T2: Identification of prospective beaches to model, application of Discard model and develop multivariate or other models if model validation fails.
- WP T3: Equipment infrastructure deployment (telemetric weather stations, river sensors and in the later stages electronic signage).
- WP T4: Develop software infrastructure (supporting real-time data acquisition, predictive modelling and media dissemination).
- WP T5: Microbiological validation of Bathing water quality prediction models (Microbiology and Microbial Source Tracking).
6 Proposed Northern Ireland Beaches?

Selection matrix?
- Water Quality
- Foot Fall
- Profile
- Data
- Model

Steering group proposed
(Castlerock, Portrush Curran, Crawfordsburn, Ballyholme, Newcastle, Cranfield)
Infrastructure Deployment NI

- Telemetric weather stations (6 x 2 Beach)
- Telemetric river sensors
- Electronic signage (2 NI, 1 ROI)

AFBI Weather Stations:

AFBI GrassCheck (30), SWIM (12), SWELL (6), Source To Tap (2)

Rain Radar?
Bathing Water Directive (2006/7/EC)

- Water microbiology (4 bathing seasons 95th/90th percentile) define Bathing water quality classification
- A poor water quality result can be discarded (discounted)
  - Advance prediction of Poor water quality
  - Public warned in advance (signage)
  - Resamples taken to replace disregarded samples
  - Only 15% samples can be disregarded per season
  - Discounting impact on bathing water quality classification.

(Decision tree, ExcelThreshold discounting, Multi variant linear regression).
Legacy

- Develop Bathing water quality prediction model
- Incorporate the best of existing models
- Application to 6 NI and 2 ROI (as limited resources)
- Fully automated model utilising electronic signage
- Develop capability of roll out