Carrying Capacity – Tools, Results and User Perspectives
Dublin
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Validating & Ground Truthing Models For Aquaculture

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SCOTTISH ASSOCIATION for MARINE SCIENCE

Validating & Ground Truthing Models For Aquaculture

- Models are simplistic representations of complex systems
- They attempt to replicate what we see in the real world
- They can be used to predict outcomes of various scenarios
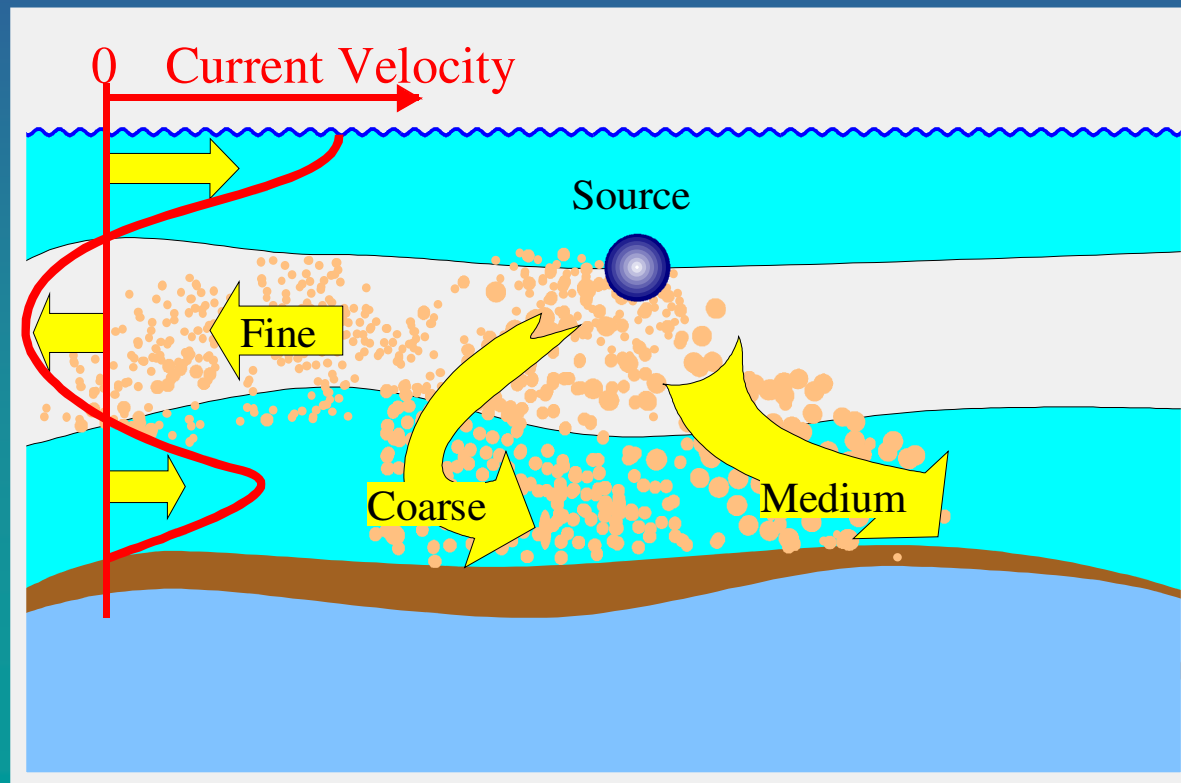- They need 'ground truth' and realistic parameters - validation

Validating & Ground Truthing Models For Aquaculture

Aquaculture models at SAMS predict solids output from fish farms and their benthic effects

- DEPOMOD - for salmon
- CODMOD - cod
- MERAMOD - sea bass & sea bream
- TROPOMOD - milkfish & tilapia
- MUSMOD - mussels

DEPOMOD - predicting solids deposition from salmon farms for regulatory use - using modelling to consent biomass of farm using the Allowable Zone of Effect (AZE) approach
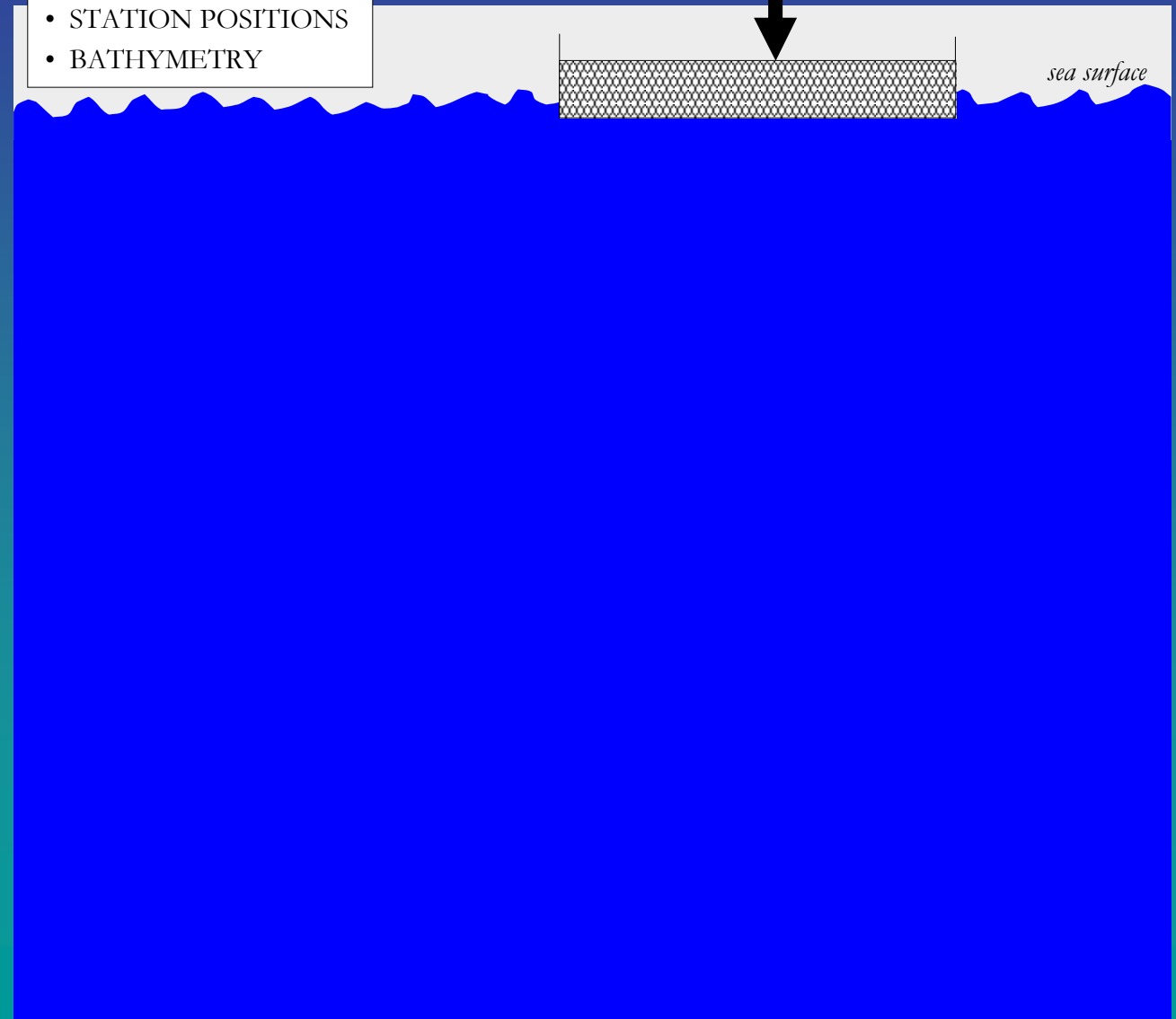
DEPOMOD - module components

INPUT
- CAGE POSITIONS
- STATION POSITIONS
- BATHYMETRY

GRID GENERATION MODULE

sea surface

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→ **GRID GENERATION MODULE**

sea surface

INPUT
- VARY FOOD INPUT *via* FISH GROWTH MODEL
- PARTICLE ATTRIBUTES
- VELOCITY DATA

PARTICLE TRACKING MODULE

- FOOD/FAECES WITH DIFFERENT SETTLING VEL.
- ADVECTION OF PARTICLES BY CURRENTS
- STRATIFICATION MODEL
- TURBULENCE (RANDOM WALK)

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water column

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- RESUSPENSION SPEEDS / CARBON FRACTIONS / RATE CONSTANTS (from field and laboratory work

underlying sediment layer

RESUSPENSION FROM BED

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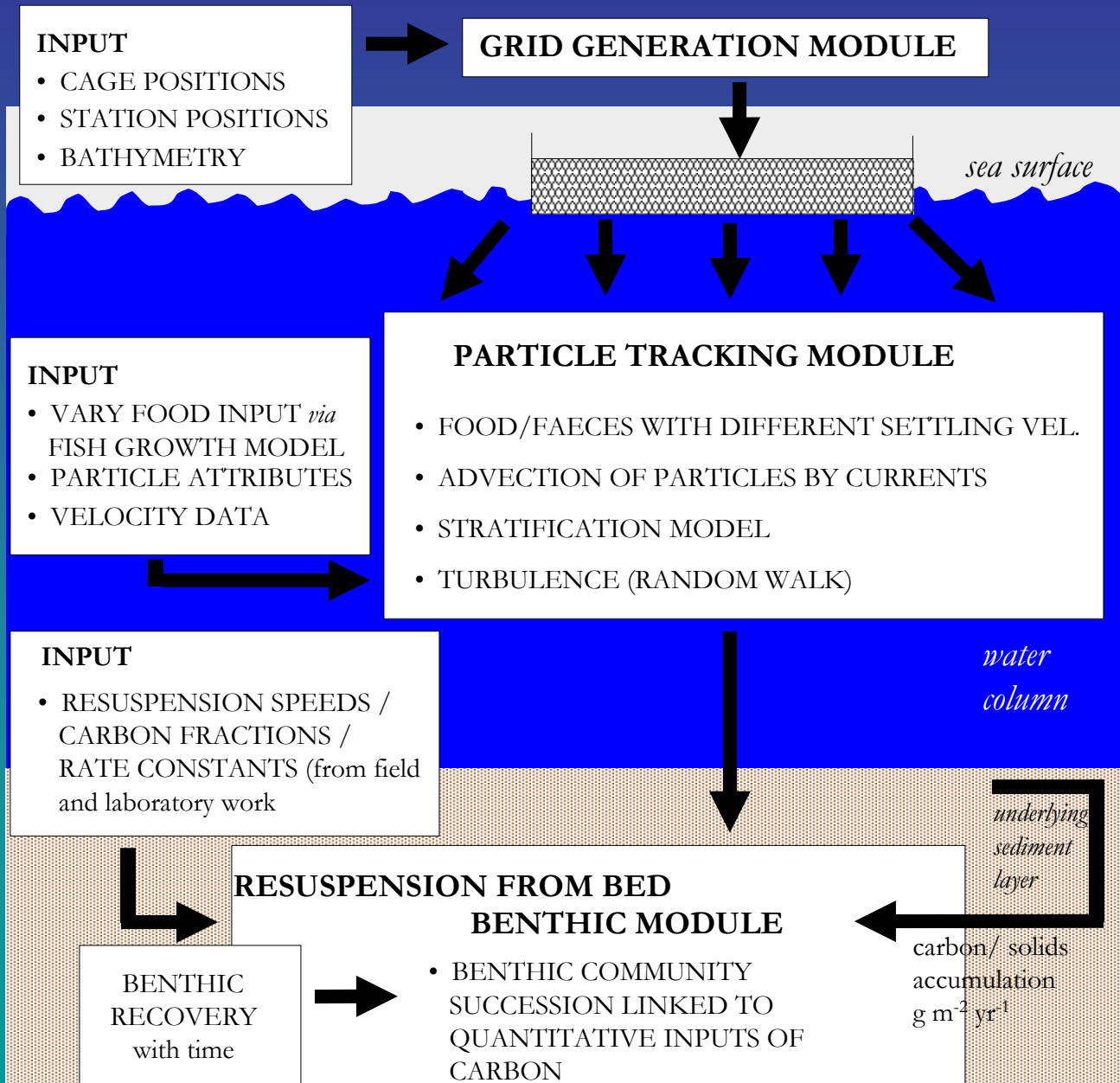
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BENTHIC MODULE

BENTHIC RECOVERY with time

→

- BENTHIC COMMUNITY SUCCESSION LINKED TO QUANTITATIVE INPUTS OF CARBON

carbon/ solids accumulation g m^{-2} yr^{-1}

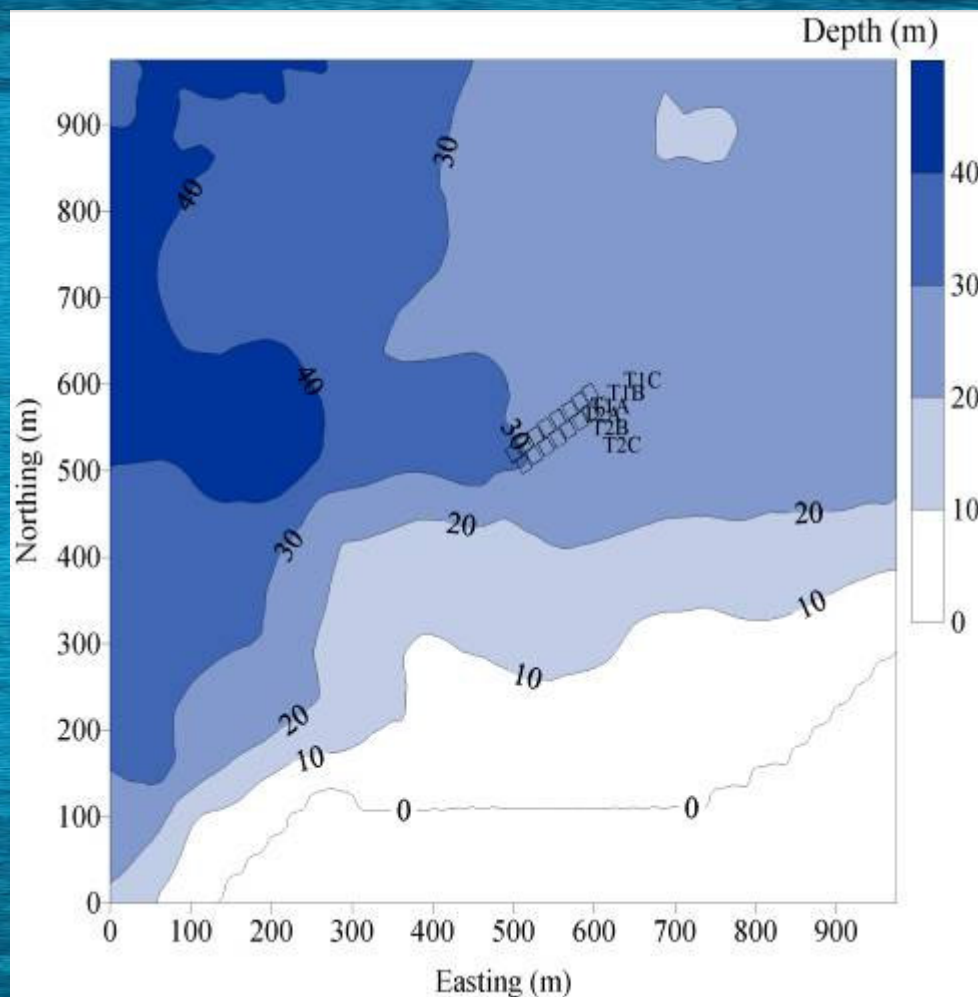SCOTTISH ASSOCIATION for MARINE SCIENCE
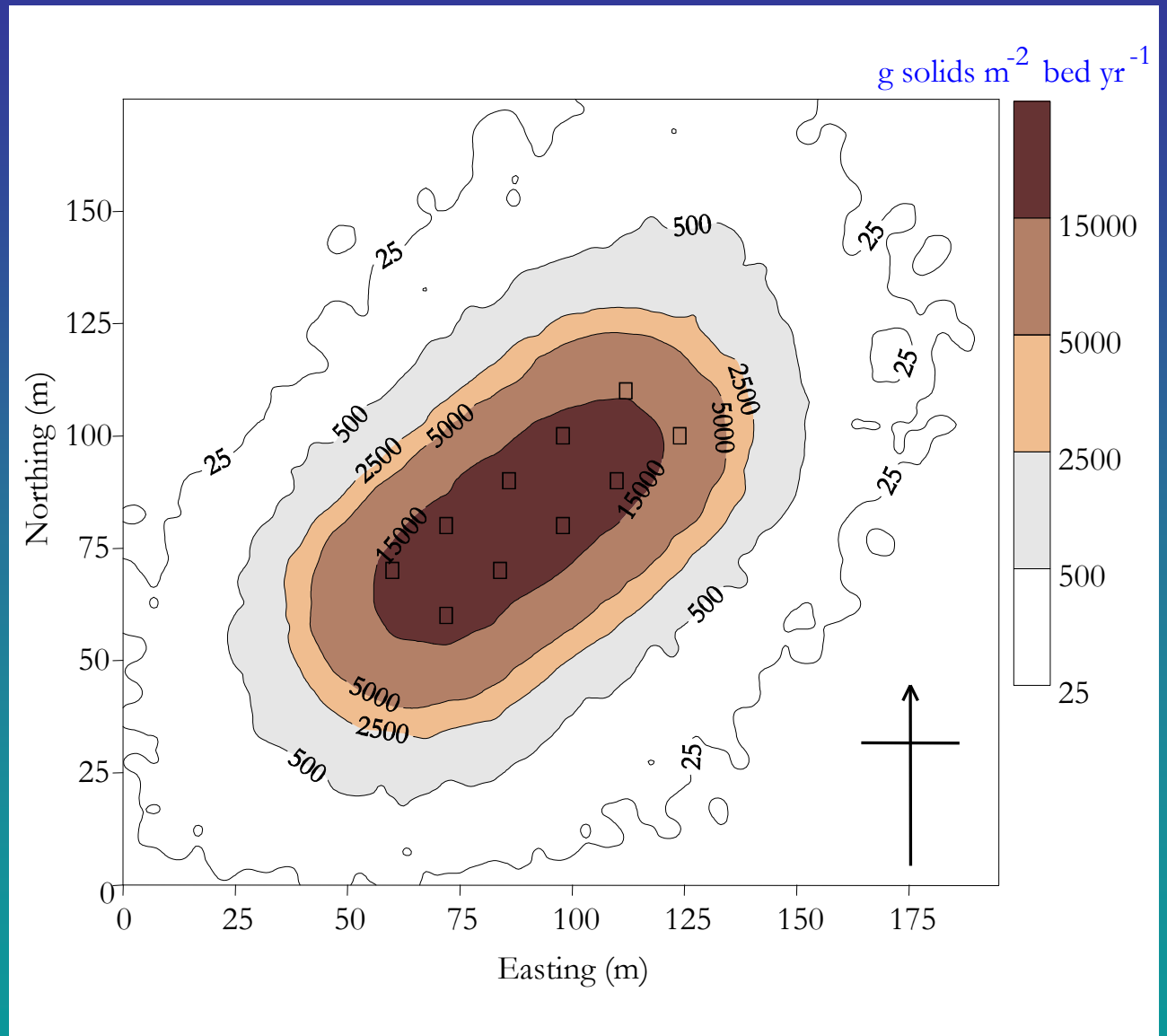
DEPOMOD input data for site investigation

Grid generation model | Data source

Bathymetry | RoxAnn™ survey

DEPOMOD input data for site investigation
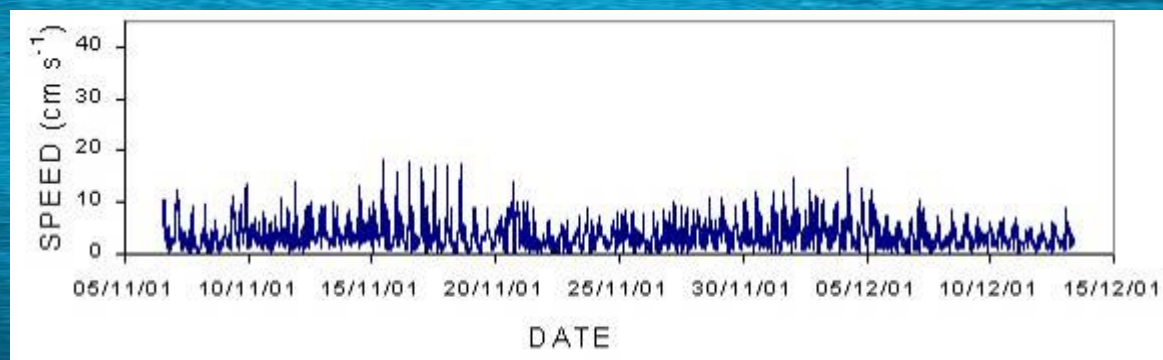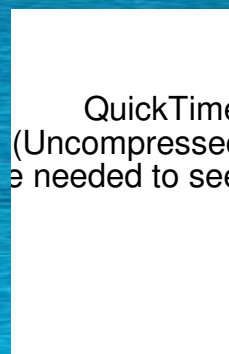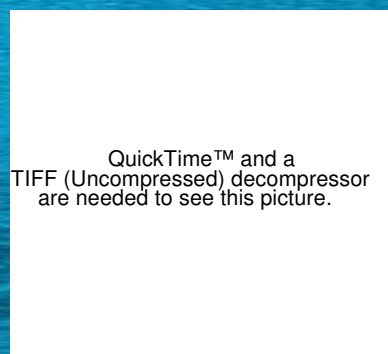
Grid generation model	Data source
Bathymetry	RoxAnn™ survey

Particle tracking model	Data source
Hydrodynamic data	High quality current meter data, min. 15 day record (10 minute data)

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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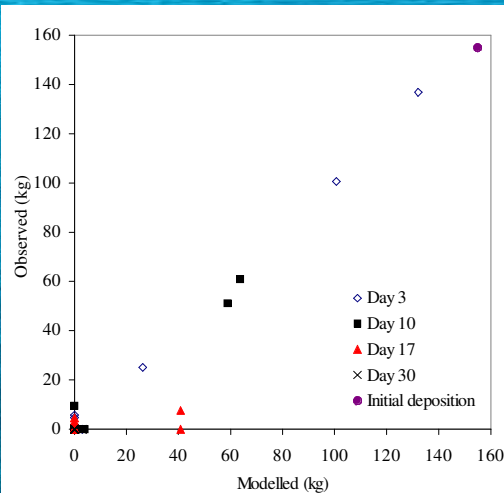| Particle tracking model	Data source
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Particle numbers	1.4*10^6 particles started in a random position (x,y,z) in the cage
Resuspension	Critical threshold value from field experiment $v_r \approx 9.5$ cm s^{-1}

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Feeding model	Data source
Food fed	1576 kg food d^{-1} for whole group (10 pens (16m*16m*15m) per group)
Fish faeces wasted	15% (=100%-85% digestibility) of 91% (dry wt) of food fed
No fish food wasted	According to diver observations only 1 trap contained food pellets

DEPOMOD input data for site investigation

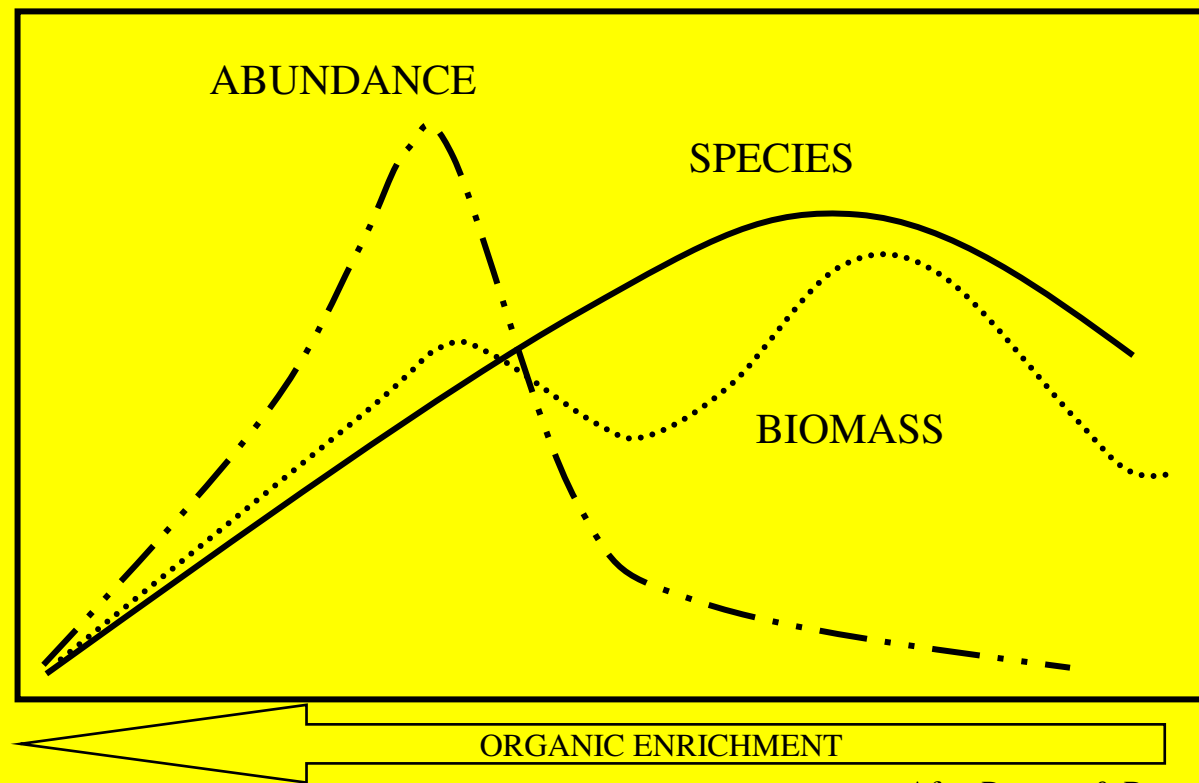Sediment traps for deployment inside (small blue traps) and outside of cages

DEPOMOD

Benthic component - Shetland cod farm

Ground truthing benthic data along gradient, workboat & winch

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DEPOMOD

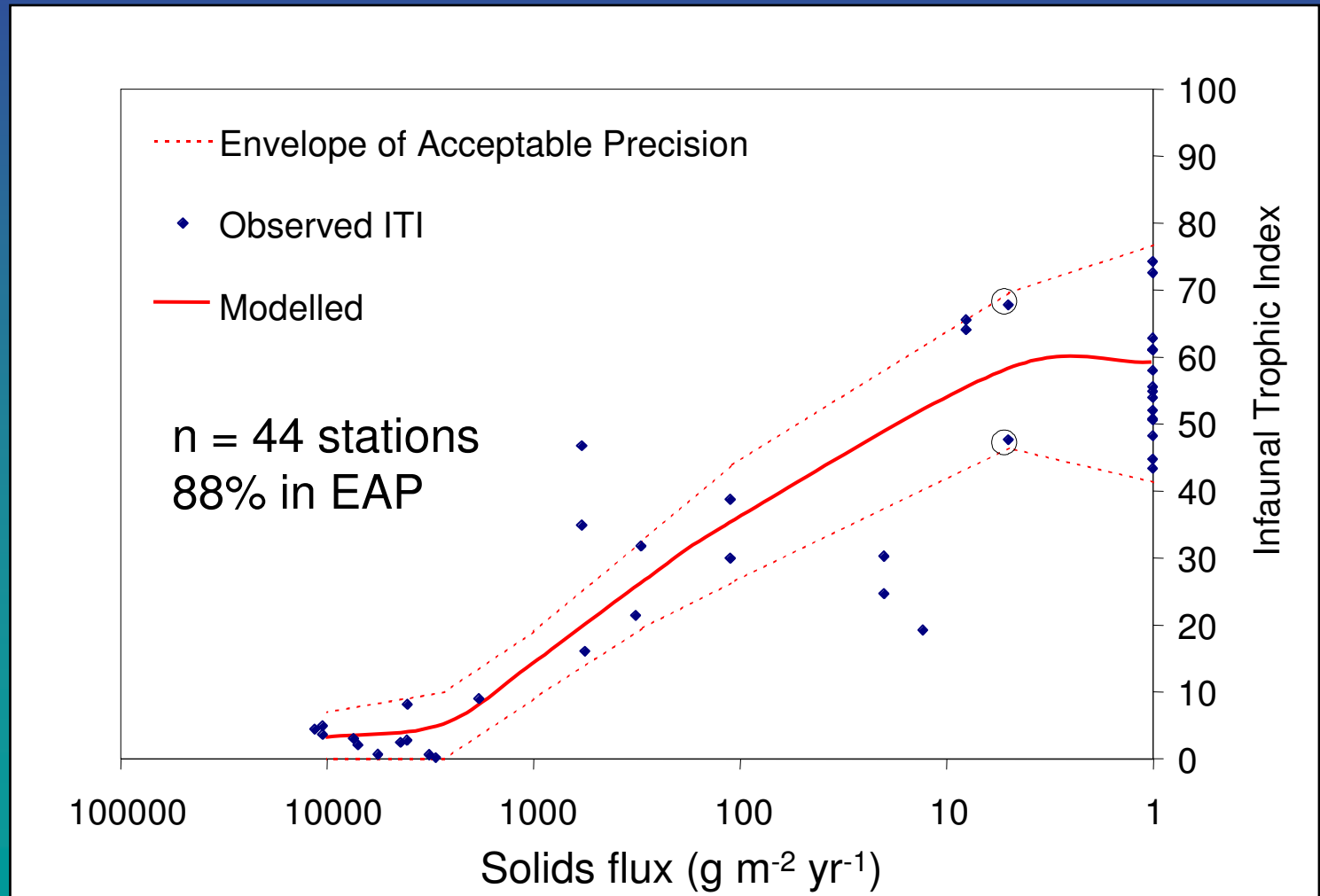## Benthic component - Philippines tilapia farm

Ground truthing benthic data along gradient, canoe and sandals

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