AQUA PARK

Planning and management of aquaculture parks for sustainable development of cage farms in the Philippines

www.aqua-park.asia

Integrated Multi-trophic Aquaculture

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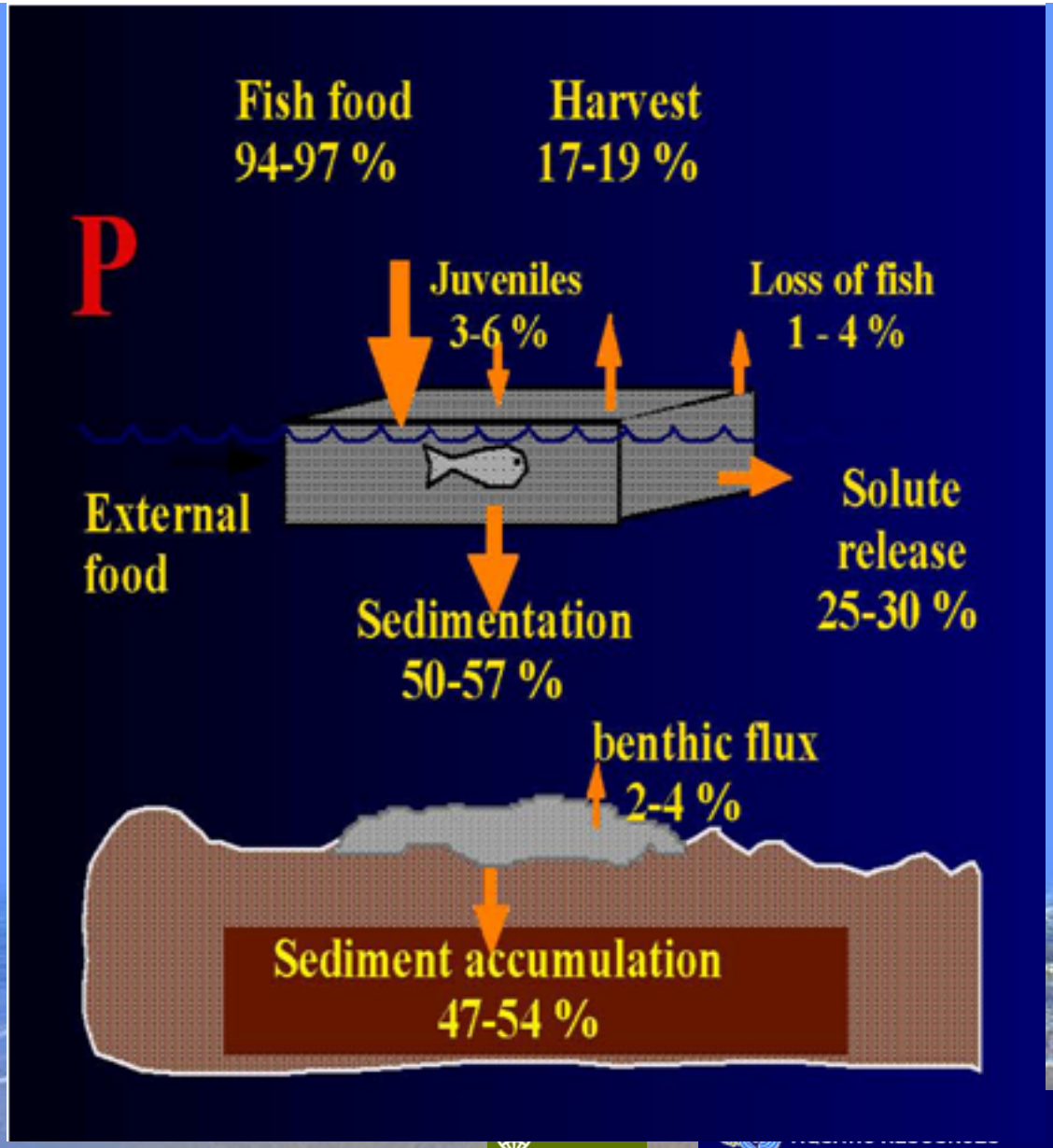
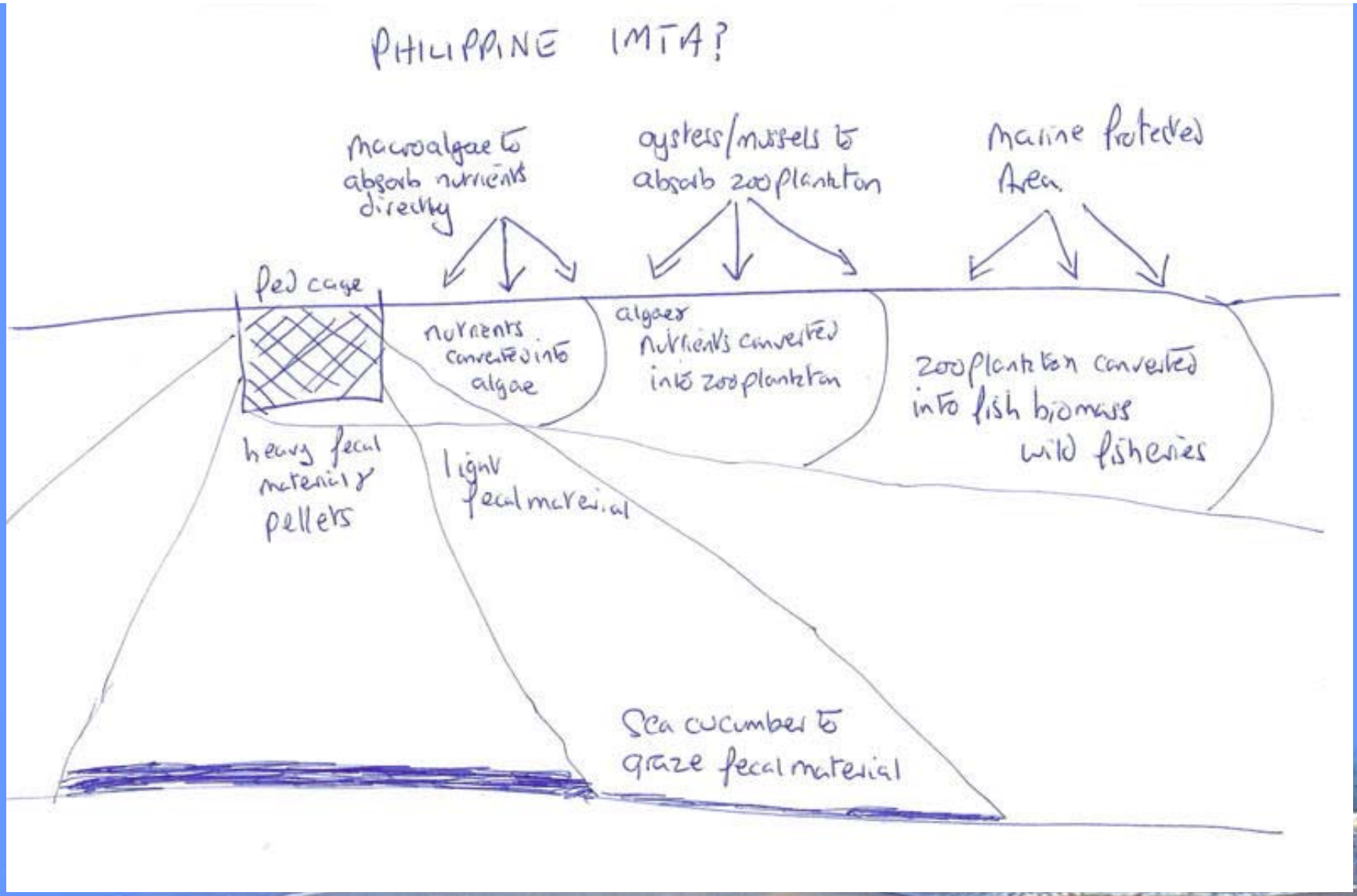
Theory

- Fed species
- 70% of feed nutrients are release to the environment
- Nutrients > Algae > Plankton > Fish
- Extractive species can capture some of these excess nutrients
- Nutrients extracted directly by algae
- Algae and zooplankton by molluscs (oysters, pearl oysters)
- Zooplankton by fish

Nutrient cycle



Concept for IMTA



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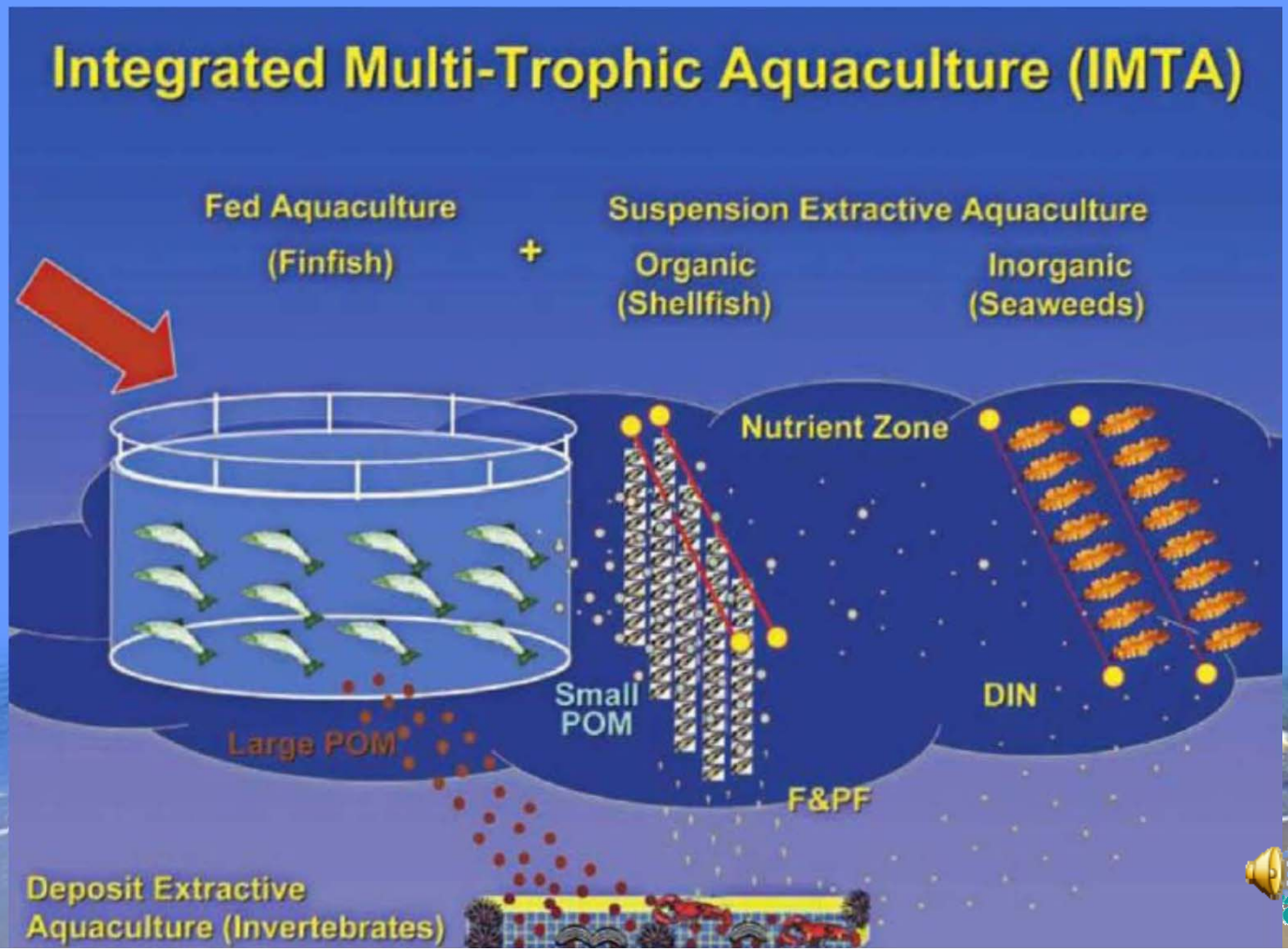
Integrated Multi-trophic Aquaculture

- Developing Integrated Multitrophic Aquaculture practice into Mariculture Parks



IMTA

- Fish
- Molluscs
- Seaweed

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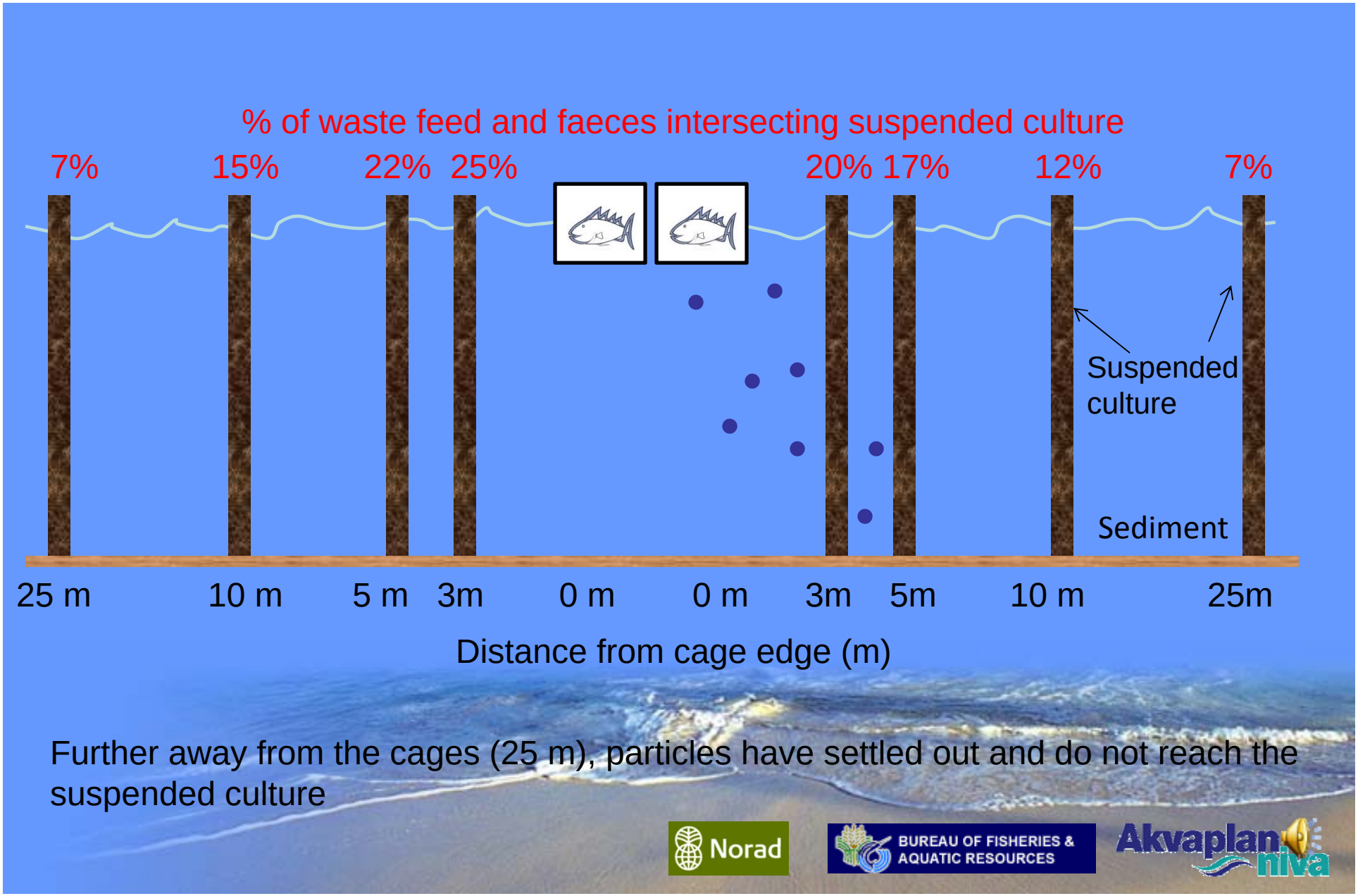
Wastes from cages reaching <u>suspended culture</u>



Further away from the cages (25 m), particles have settled out and do not reach the suspended culture

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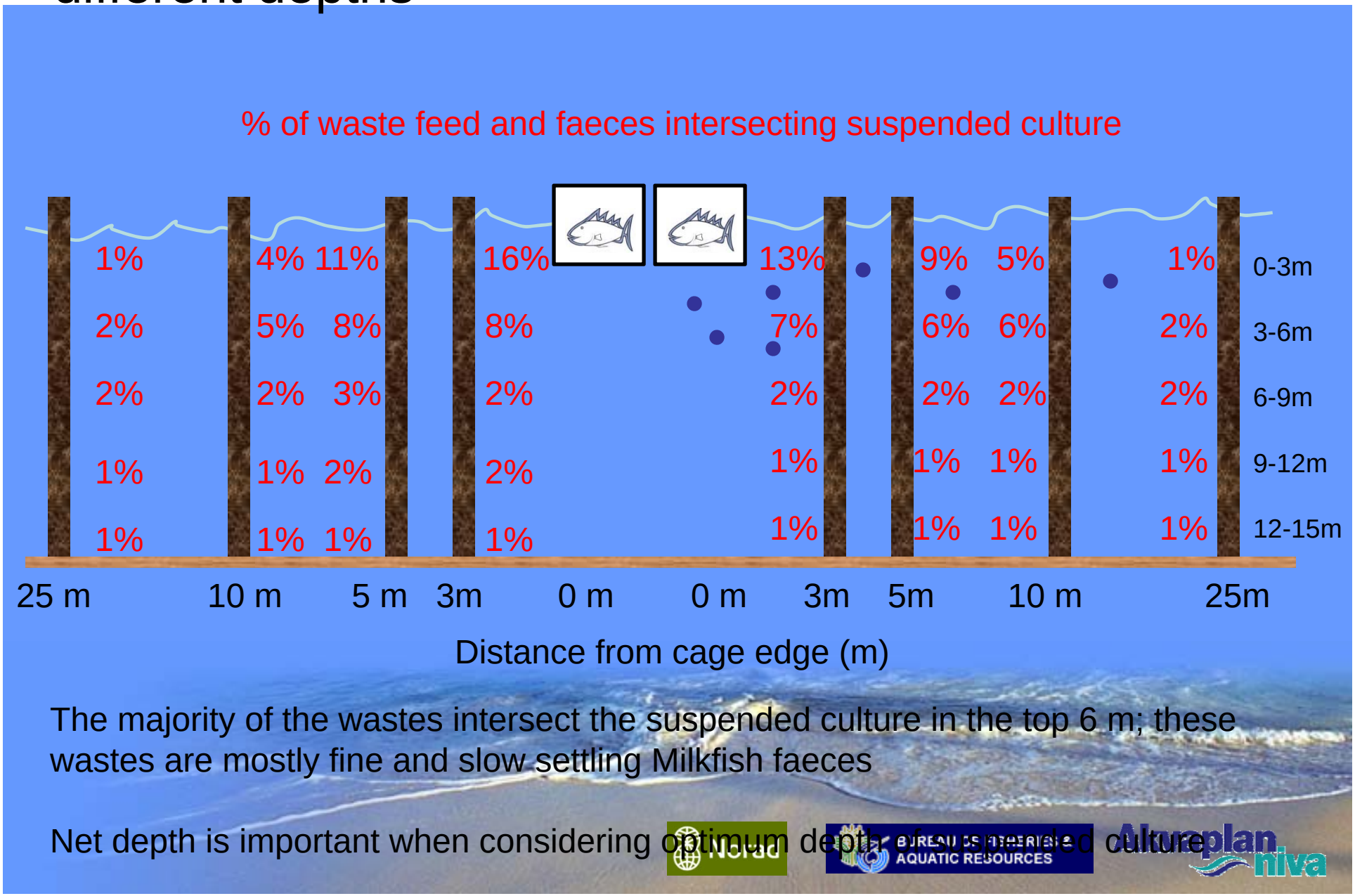
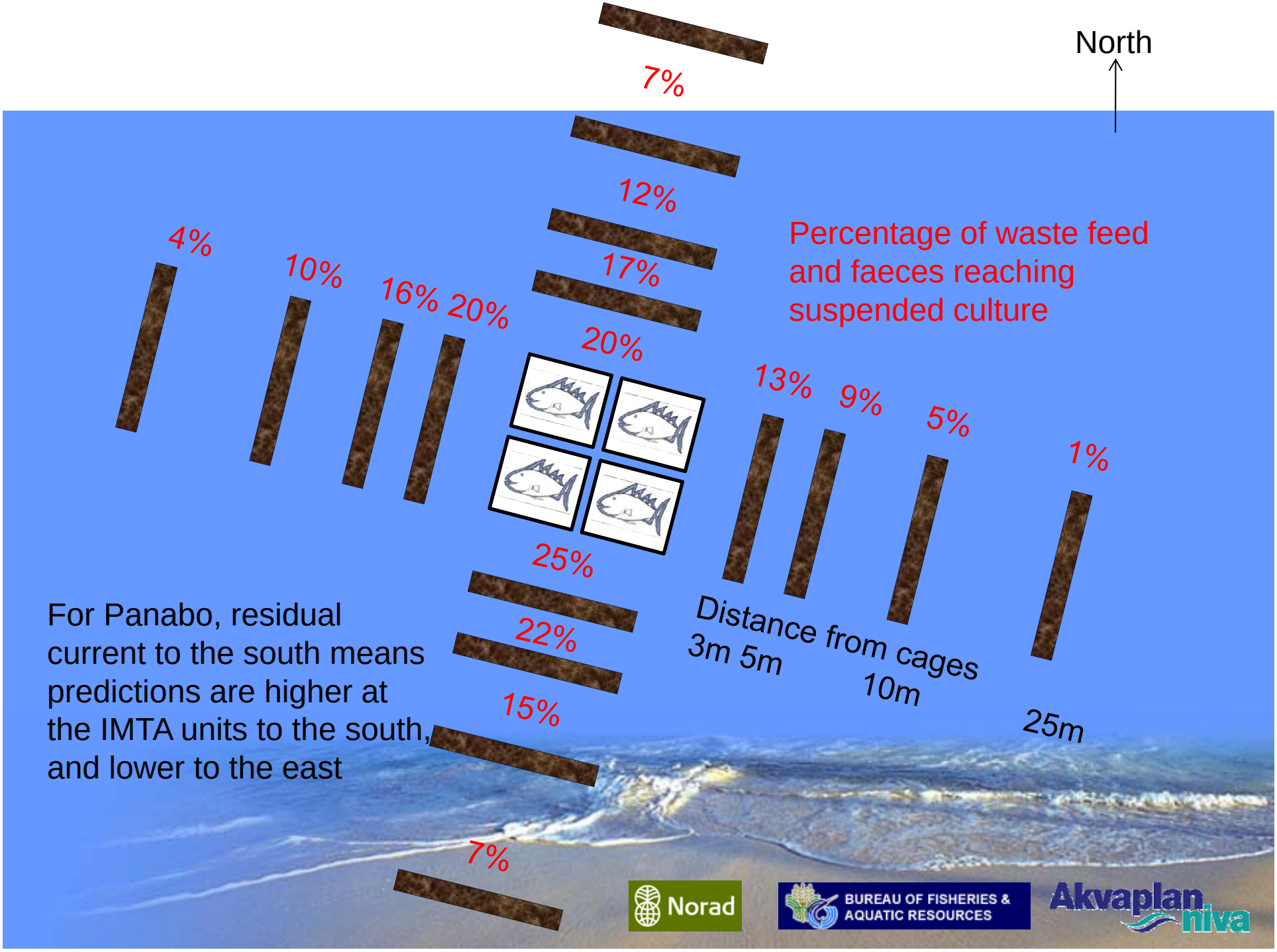
Wastes from cages reaching suspended culture at different depths



The majority of the wastes intersect the suspended culture in the top 6 m; these wastes are mostly fine and slow settling Milkfish faeces

Net depth is important when considering optimum depth of suspended culture


North
7%
12%
17%
20%
4%
10%
16%
20%
25%
22%
15%
7%
Percentage of waste feed and faeces reaching suspended culture
13%
9%
5%
1%
Distance from cages
3m
5m
10m
25m
For Panabo, residual current to the south means predictions are higher at the IMTA units to the south, and lower to the east
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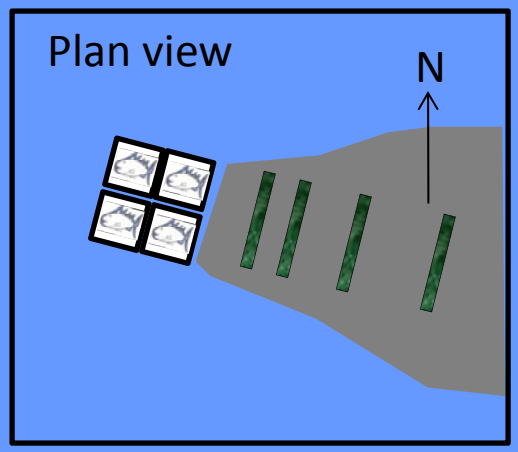
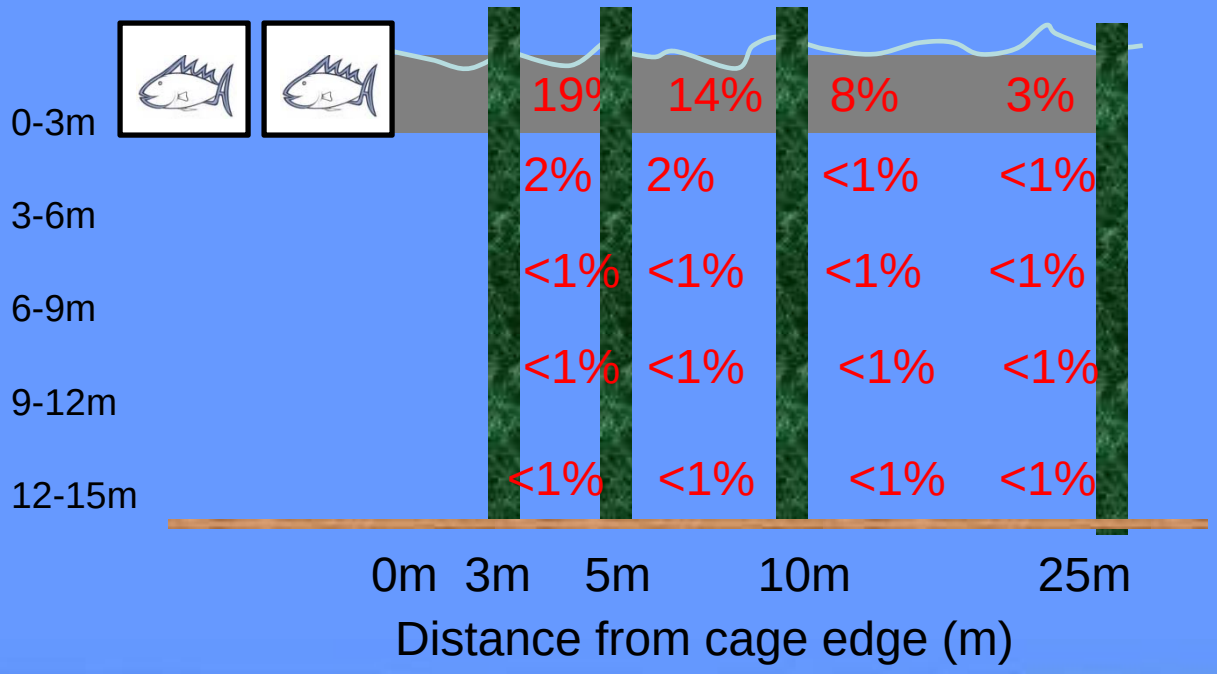
Nutrient plume from cages reaching seaweed culture at different depths

% of plume intersecting seaweed culture to the EAST of the cages



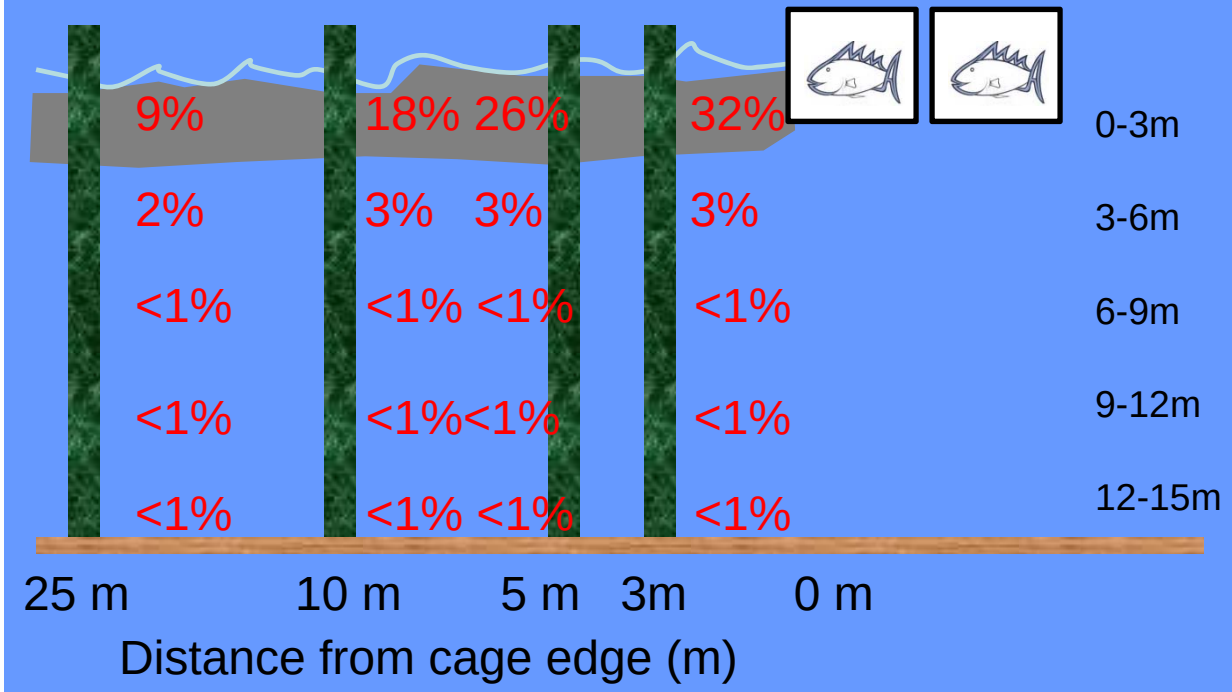


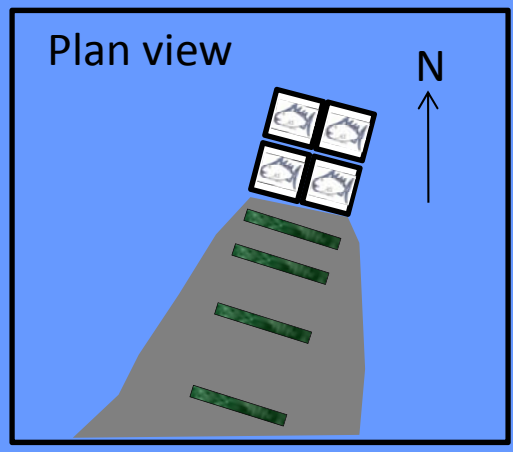
The majority of the plume containing dissolved nutrients intersects the seaweed culture in the top 3 m.

Net depth is important when considering optimum depth of seaweed culture

Nutrient plume from cages reaching seaweed culture at different depths

% of plume intersecting seaweed culture to the SOUTH of the cages





More of the plume intersects seaweed culture to the south of the cages as this is the direction of the residual current

Net depth is important when considering optimum depth of seaweed culture

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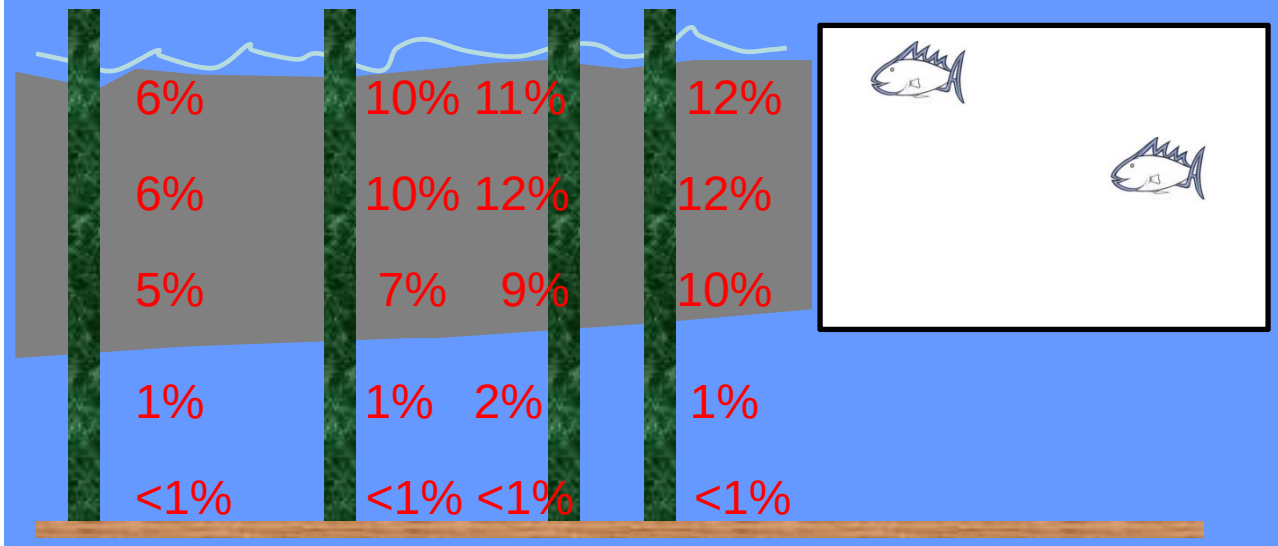
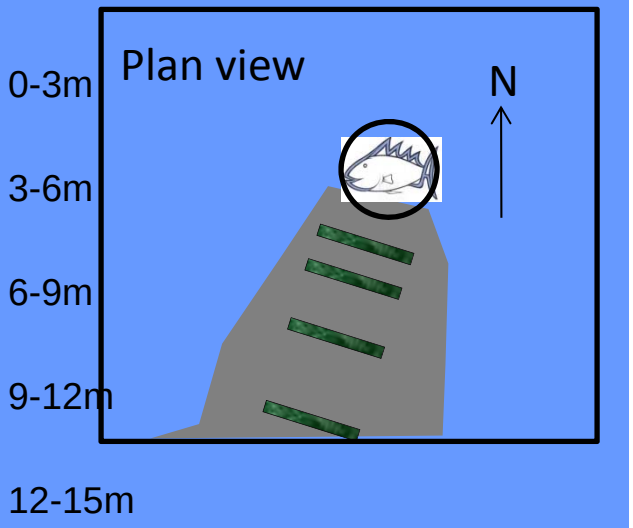
Nutrient plume from a large polar circle cage reaching seaweed culture at different depths

% of plume intersecting seaweed culture to the SOUTH of the cages





A deeper net means more of the suspended line comes into contact with the plume

Seaweed culture at depth will be limited by light rather than nutrients

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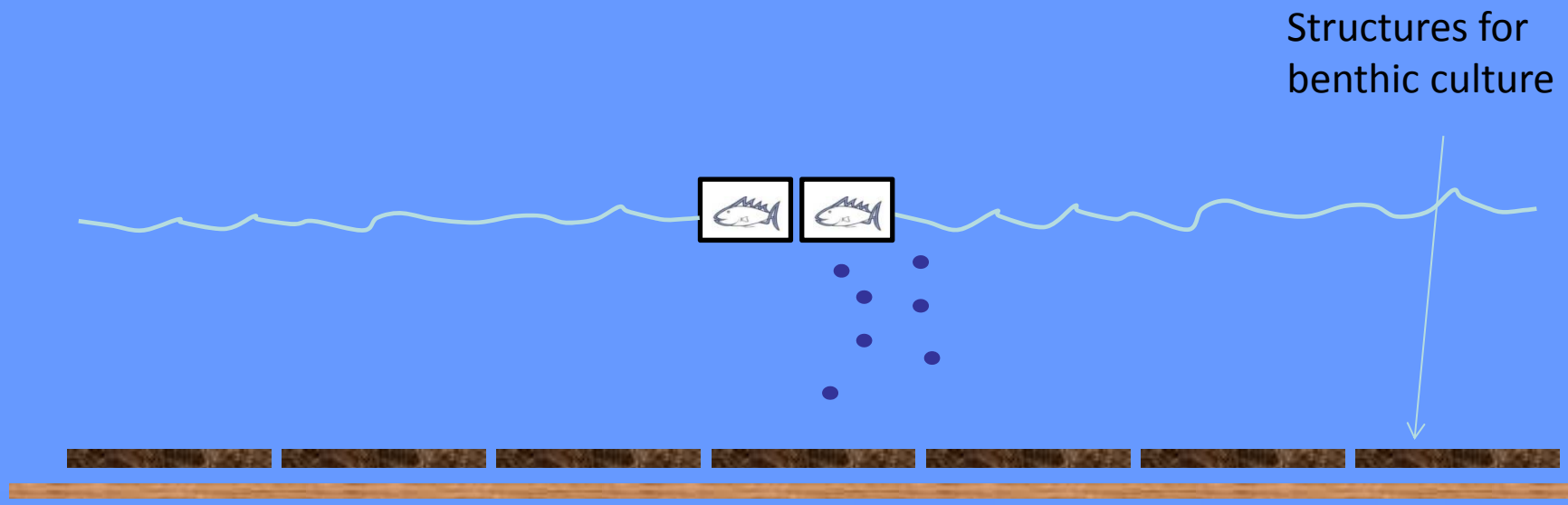
Nutrient uptake by benthic structures

TROPOMOD predictions of the waste feed and faeces depositing on 8 m by 8 m structures on the sea bed



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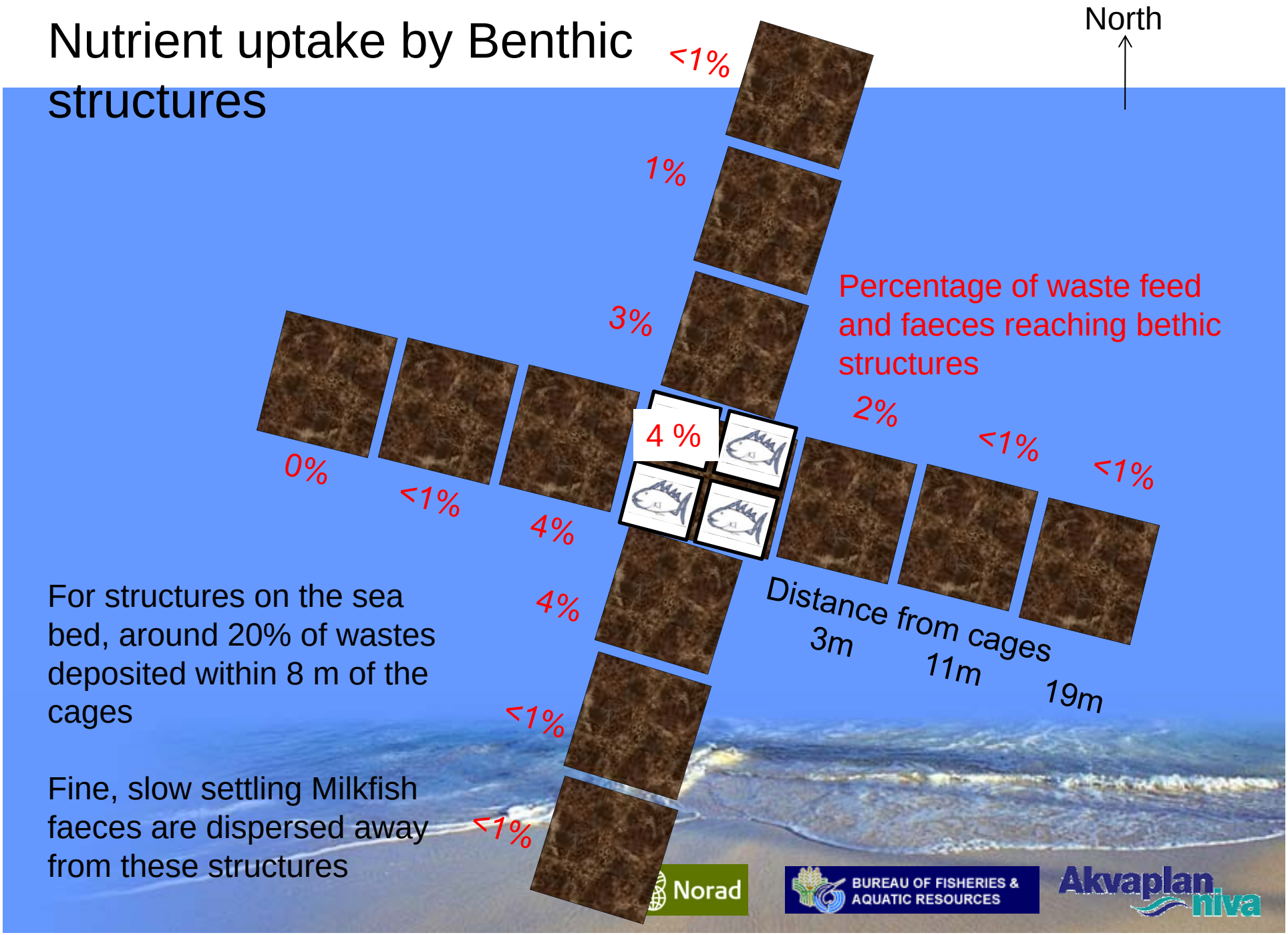
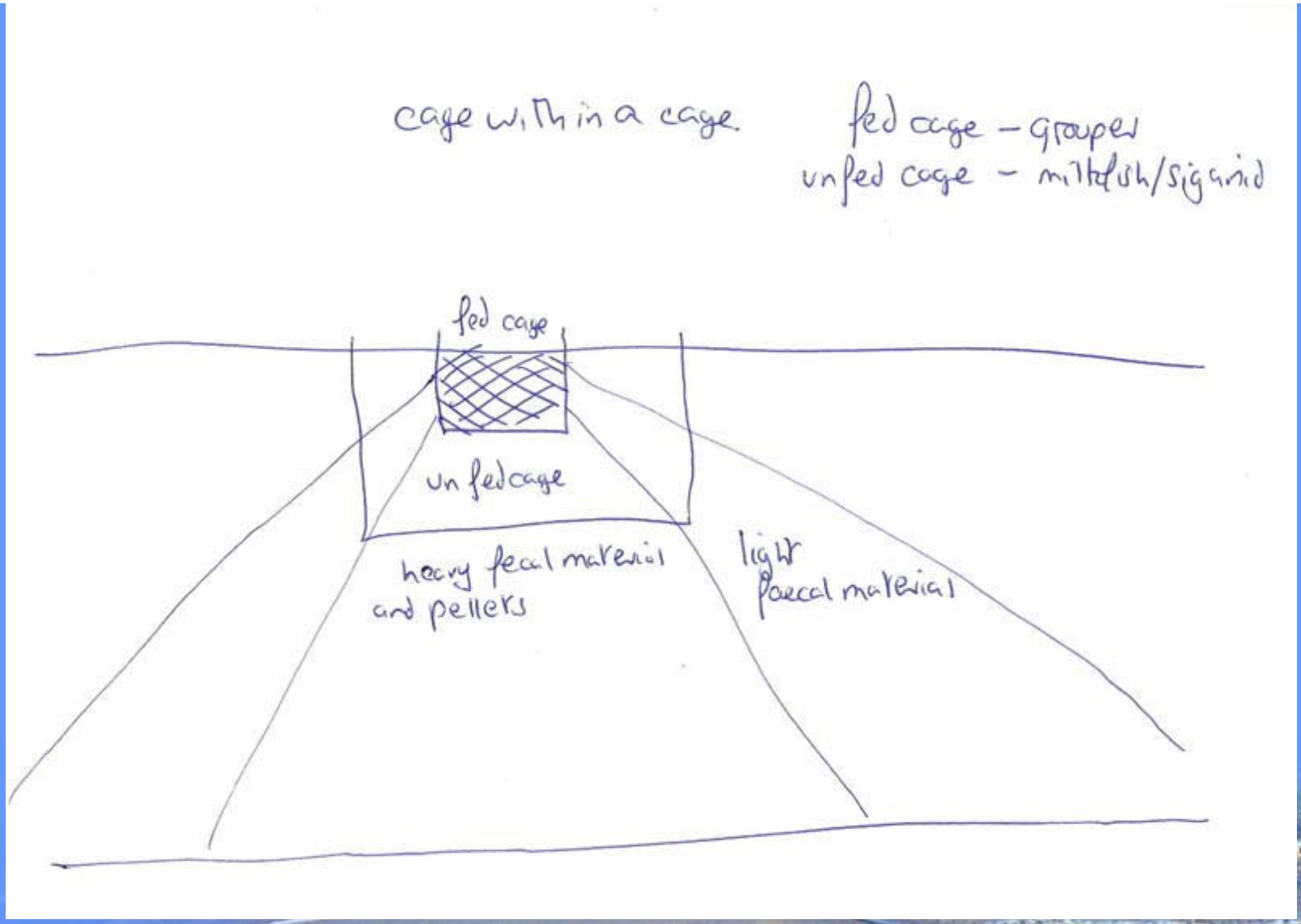
Nutrient uptake by Benthic structures



Concept of cage within a cage



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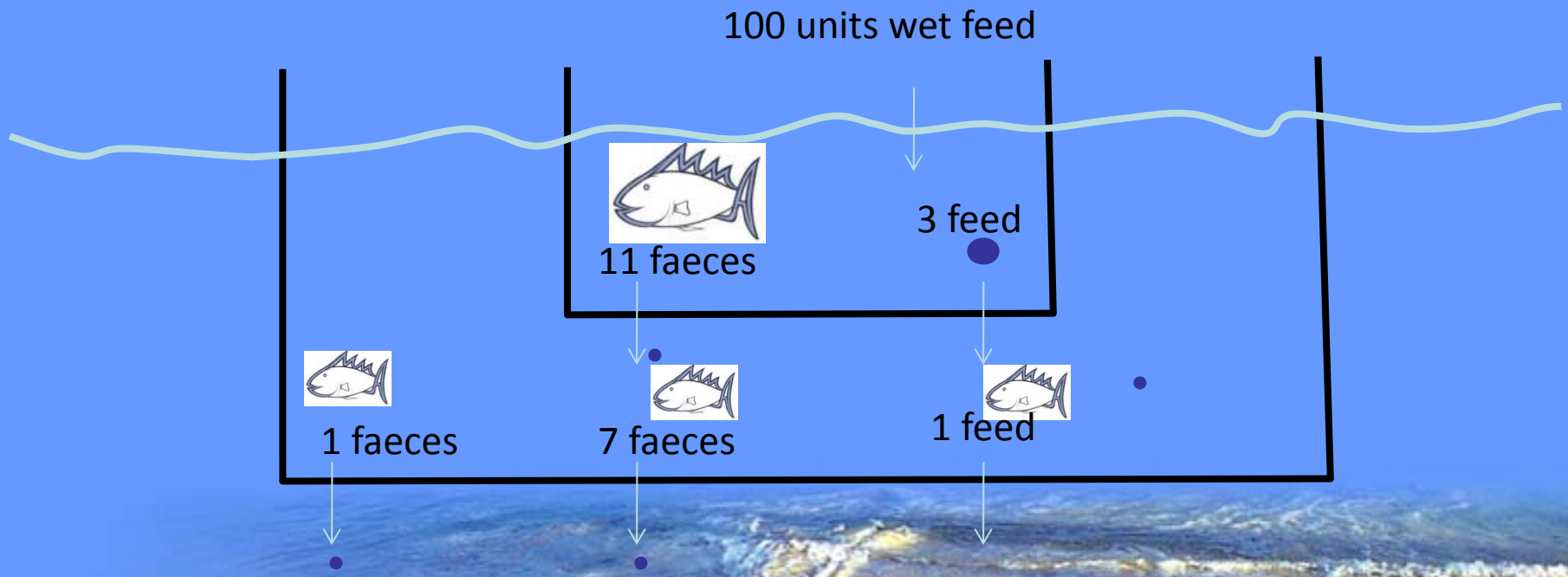
Cage in a cage

Grouper are in the inner cage, Milkfish in the outer cage

Clean outer nets are essential

Assumptions – all units are dry mass except the ration



Grouper: wasted feed – 12%, digestibility – 49 %, wet FCR 7.5

Milkfish: consumes 70 % of waste feed, 30 % of waste faeces

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Cage in a cage

- Cage in a cage illustration