

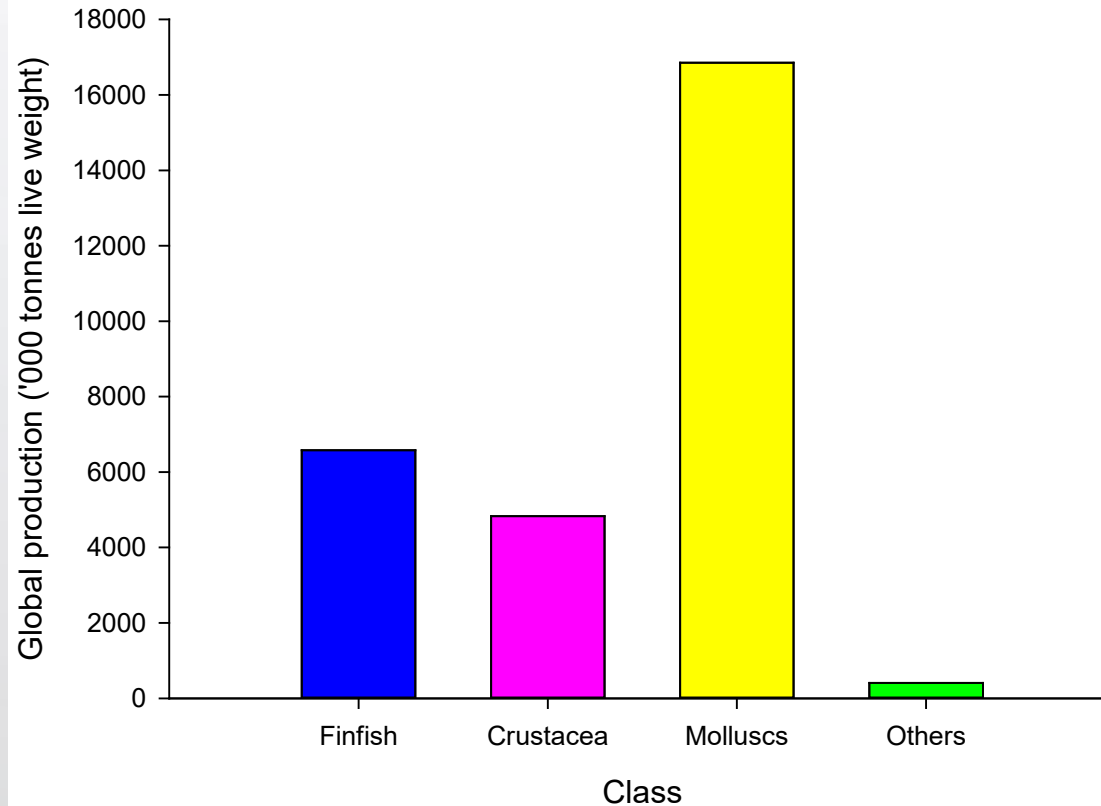
# Shellfish Production and Ecosystem Services

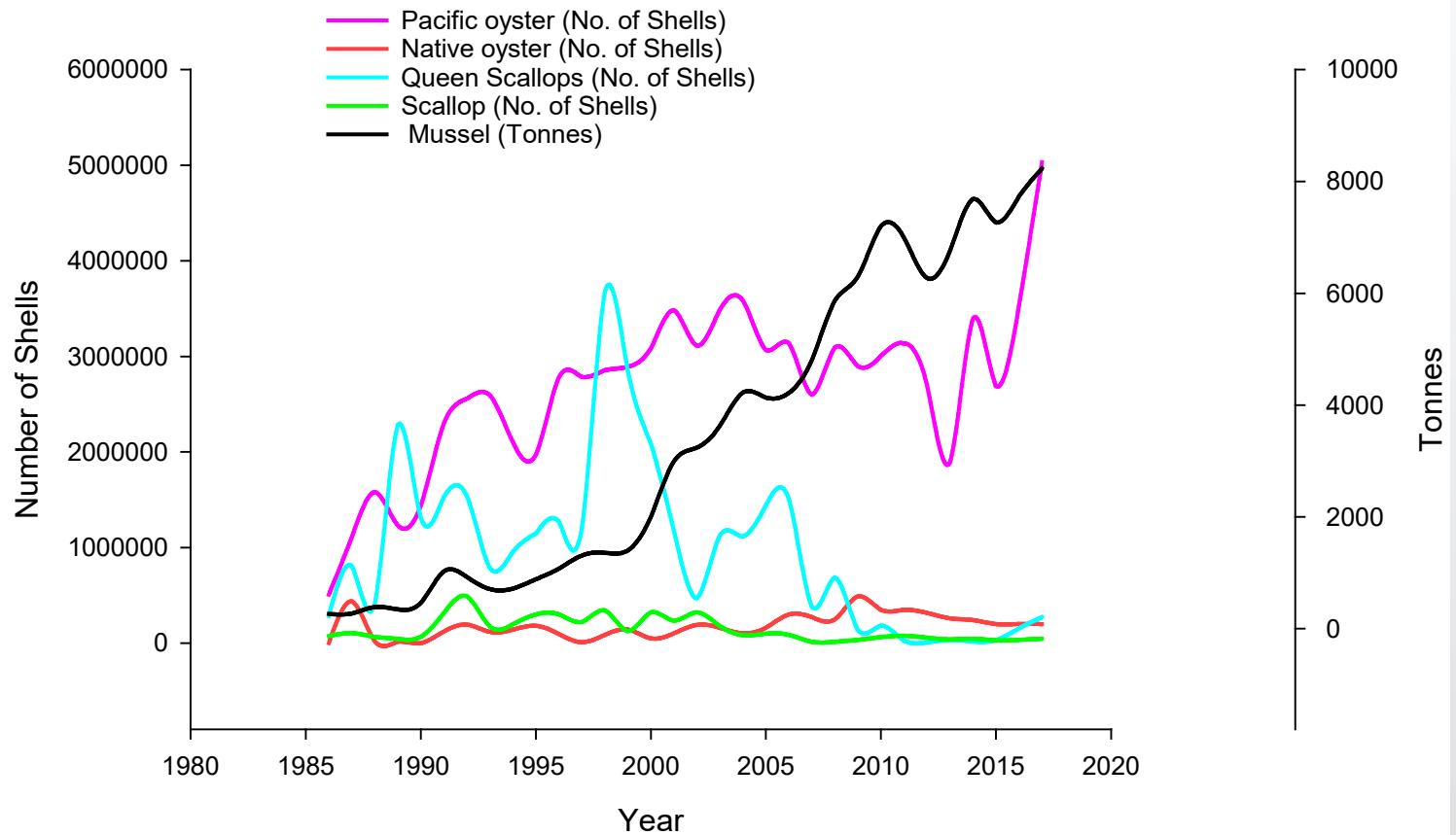
ASSG Conference 2018 – 4/5<sup>th</sup> October

Adam Hughes – SAMS / UHI Aquaculture  
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## Global Aquaculture Production





## Ecosystems services – the benefits we gain from the environment

### PROVISIONING SERVICES

*Products obtained from ecosystems*

- Energy
- Seafood
- Biomedical
- Transportation
- National defense

### REGULATING SERVICES

*Benefits obtained from the regulation of ecosystem processes*

- Flood prevention
- Climate regulation
- Erosion control
- Control of pests and pathogens

### CULTURAL SERVICES

*Nonmaterial benefits obtained from ecosystems*

- Educational
- Recreational
- Heritage
- Spiritual

### SUPPORTING SERVICES

*Services necessary for the production of all other ecosystem services*

- Biological diversity maintenance
- Nutrient recycling
- Primary productivity

source: *Final Recommendations of the Interagency Ocean Policy Taskforce, 2010*









## Provisioning

Seafood

Biomedical

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Dynamic rural communities

## Supporting Services

Biological diversity

Nutrient recycling

# Supporting Services

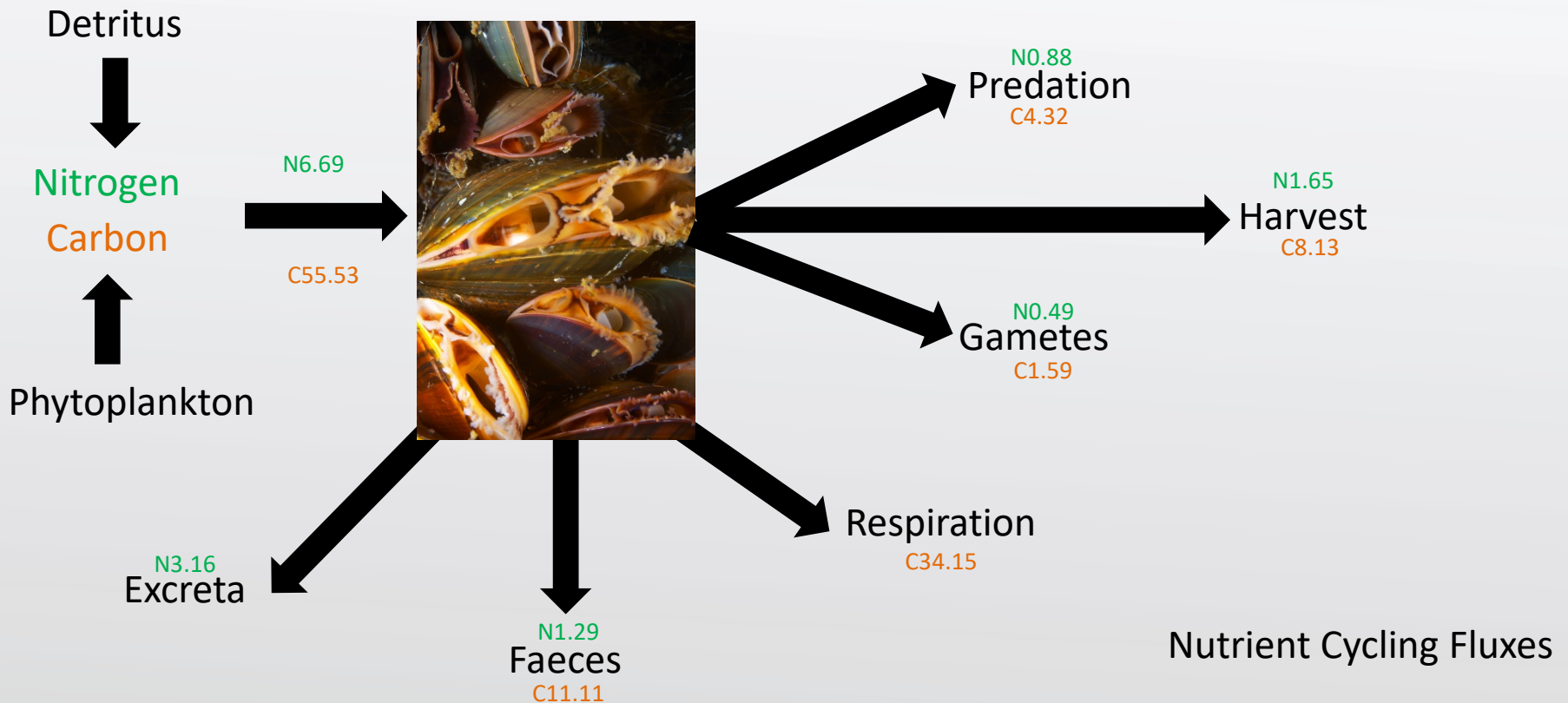
## Biological diversity



- We don't have a lot of data on the shellfish aquaculture and biodiversity
- 71 species associated with raft-grown mussels in the White Sea, Russia
- In America the biodiversity of raft grown mussels was comparable or greater than intertidal or subtidal beds
- Sub-tidal mussel beds are priority marine feature

# Supporting Services

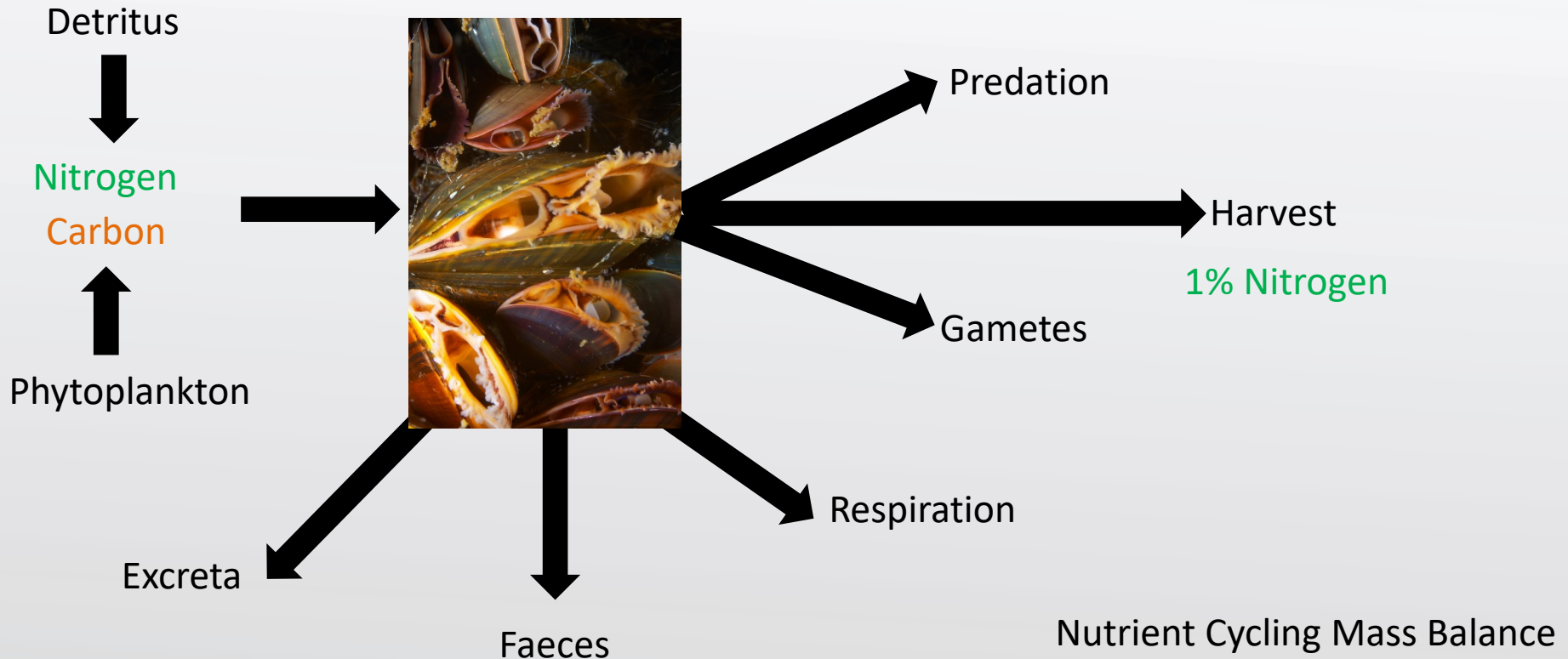
## Nutrient recycling





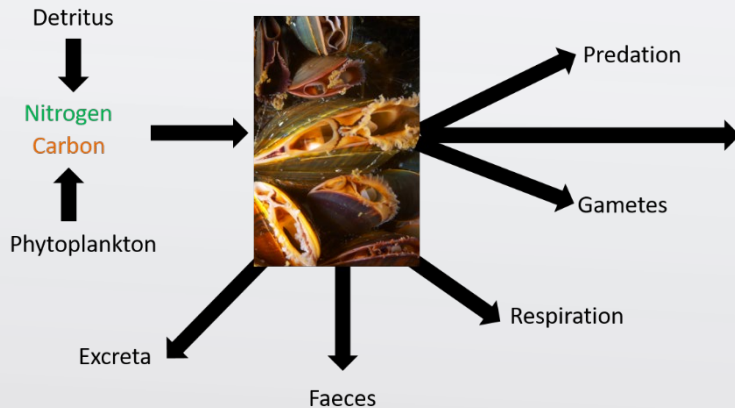
# Supporting Services

## Nutrient recycling



# Supporting Services

## Nutrient recycling



Harvest = 8000 tonnes @ 1% Nitrogen  
= 80 tonnes N

1 person = 3.5 kgN per year

80 tonnes N = 22,850 people (approx. the population of Shetland)

Approx. cost for waste water treatment =  
£600/person

=£13.7M

Nutrient Cycling Mass Balance

# Provisioning Seafood

100 g of mussels



24 g protein (56 g recommended)  
1.212 g PUFA (1g recommended)  
2.67mg Zinc (15g recommended)



# Provisioning

## Seafood



Embedded Energy (MJ/Kg)

Beef = 34.4

Chicken = 24.9

Cod (frozen) = 61.9

Salmon = 57.0

Mussel = 12

## Regulating

Climate regulation



It is complicated and we don't have the answer but.....

**Carbon contributes 12g for every 100g of shell, or 12% of overall shell mass.**

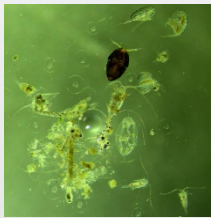
## Regulating Climate regulation



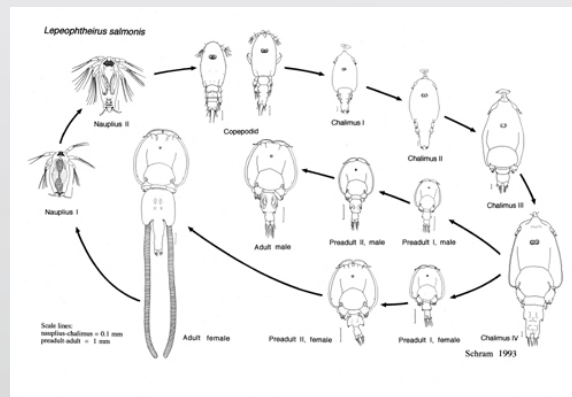
Therefore it is highly possible that shellfish production is a net source of  $\text{CO}_2$



# Regulating Pest control



**Shellfish as  
sea lice  
control?**



# Cultural Service

## Dynamic rural communities



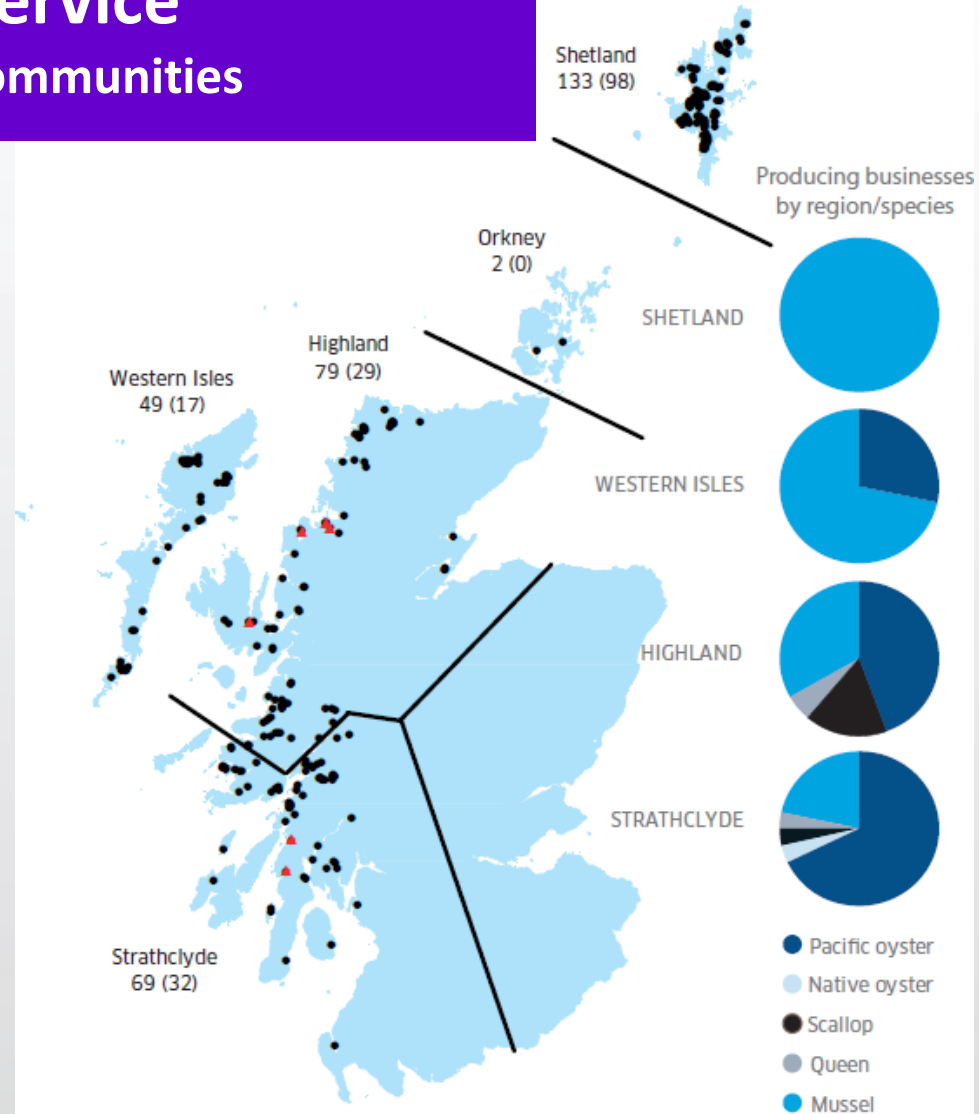
Value of aquaculture shellfish production at first sale was £10.1m

144 shellfish businesses operating in Scotland in 2015

Shellfish 1,054fte (direct and indirect)  
£25.9M earnings and £50M GVA

# Cultural Service

## Dynamic rural communities





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