

# Preventing a Pickle with Cucumbers



"Just because you can't see it, doesn't mean it isn't there" – Phillip Round

## BC's aquaculture waste problems could be solved with integration of sea cucumber farming

### Recommendations & Implications

#### R Allow only introduction by integrated multi-trophic aquaculture

- I Will introduce sea cucumber farming as a waste mediation solution instead of producing new environmental issues

#### R Keep stocks contained

- I Keeps wild individuals from being mistaken for farmed by keeping them separated

#### R Set density limits

- I Reduce likelihood of disease and other health issues

#### R Use set number of wild individuals for brood stock

- I Increase genetic diversity

### Summary

With the addition of sea cucumber aquaculture on BC it is critical that we assure the farming will not have detrimental effects on the coast. Concerns are with environmental impacts as well as harm to wild populations. This can be avoided with introduction exclusively through integrated multi-trophic aquaculture (IMTA) with existing practices such as shellfish and salmon as well as through containment of farmed stocks.

Sea cucumbers are a prized meal in Asia, causing intensive fishing pressure all over the world. This demand is creating growing interest in sea cucumber farming in British Columbia. Currently there is a thriving sea cucumber fishery for the species *Parastichopus californicus*, the species also of interest for aquaculture practices. There are financial interests as the 2010 wholesale value of *P. californicus* processed in BC was \$6.4 million (DFO 2012/2013).

Sea cucumbers are decomposers, which consume decomposing matter and wastes, giving them the status of "earthworm of the sea".

That quality makes them key to ecosystem nutrient recycling by feeding on waste of other species.

Currently aquaculture ranchers in B.C. are allowed to sell any of these cucumbers found on their lines or cages, but they are looking to benefit further. Due to the young nature of these practices in BC, practices vary and applications are left vague. Regulatory powers need to take action and set policy outlining acceptable practices. Policy needs to ensure practices provide environmental benefits not produce environmental concerns, or allow any potential negative effects on the wild stocks.

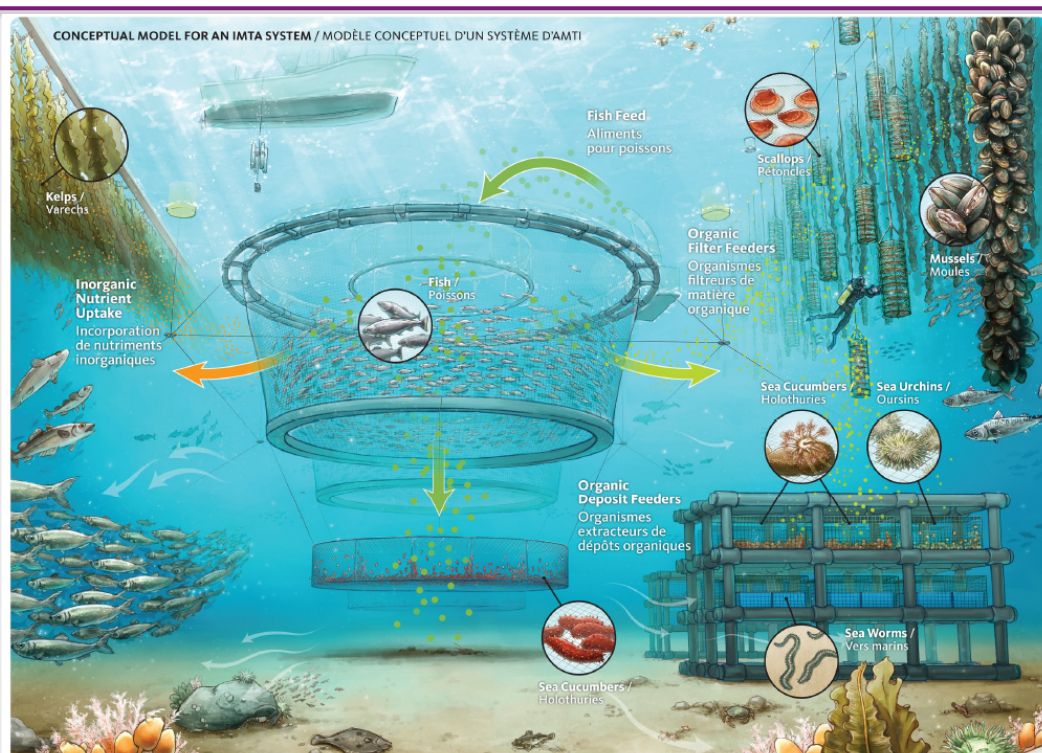
## What should be done?

Aquaculture practices such as Atlantic salmon and shellfish can create high volumes of waste which can cause poor water and sediment quality (Barinaga 1990; Feral 1985; Kaspar *et al.* 1985), leading to health issues in the stock (Moller 1985). However, adding sea cucumbers to these farming practices can improve these conditions, as well as produce an additional product

(Ahlgren 1998). Ahlgren (1998) found that *P. californicus* also found muscle development to be greater in the farmed sea cucumbers than individuals in natural grazing habitat.

While introducing more ranching, outlining practices to keep farmed stocks contained and separated from wild stocks is crucial to keeping the wild population healthy. Open practices with no containment

run the high risk of seizing wild stock in addition to cultivated stock. Now with closed containment comes possible health concerns with high densities of sea cucumbers. However, with restrictions outlining maximum density as well as the number of wild brood stock for production, health and genetic diversity can be maintained.



This integrated multi-trophic aquaculture model illustrate the use of sea cucumber containment below two different aquaculture practices on the BC coast. Atlantic salmon and shellfish ranching can cause environmental damage which sea cucumber introduction can mitigate! Notice that the sea cucumbers are contained as to keep separate from wild populations. To view this image in more detail visit: <http://www.dfo-mpo.gc.ca/aquaculture/sci-res/imta-amti/images/imta-amti-007-large.jpg>

## Problem Solving: the IMTA way

- ⇒ Aquaculture practice leaves **food and biological wastes**.
- ⇒ Instead of letting of accumulating in water and sediments, **sea cucumbers consume** the matter
- ⇒ Sea cucumbers produce nutrient rich feces to be **recycled into the ecosystem** like an **“earthworm”**
- ⇒ We end up with more **environmentally sound farming practices**
- ⇒ And are adding another **valuable commodity** for export



Dominique Bureau, <http://aquaculturenorthamerica.com/research/can-you-keep-them-on-the-farm%3F>

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