INTEGRATED MULTI-TROPHIC AQUACULTURE (IMTA)

Is a practice in which the by-products from one aquaculture species are recycled to function as inputs for another.

Maine Aquaculture Association Est. 1978

www.maineaqua.org

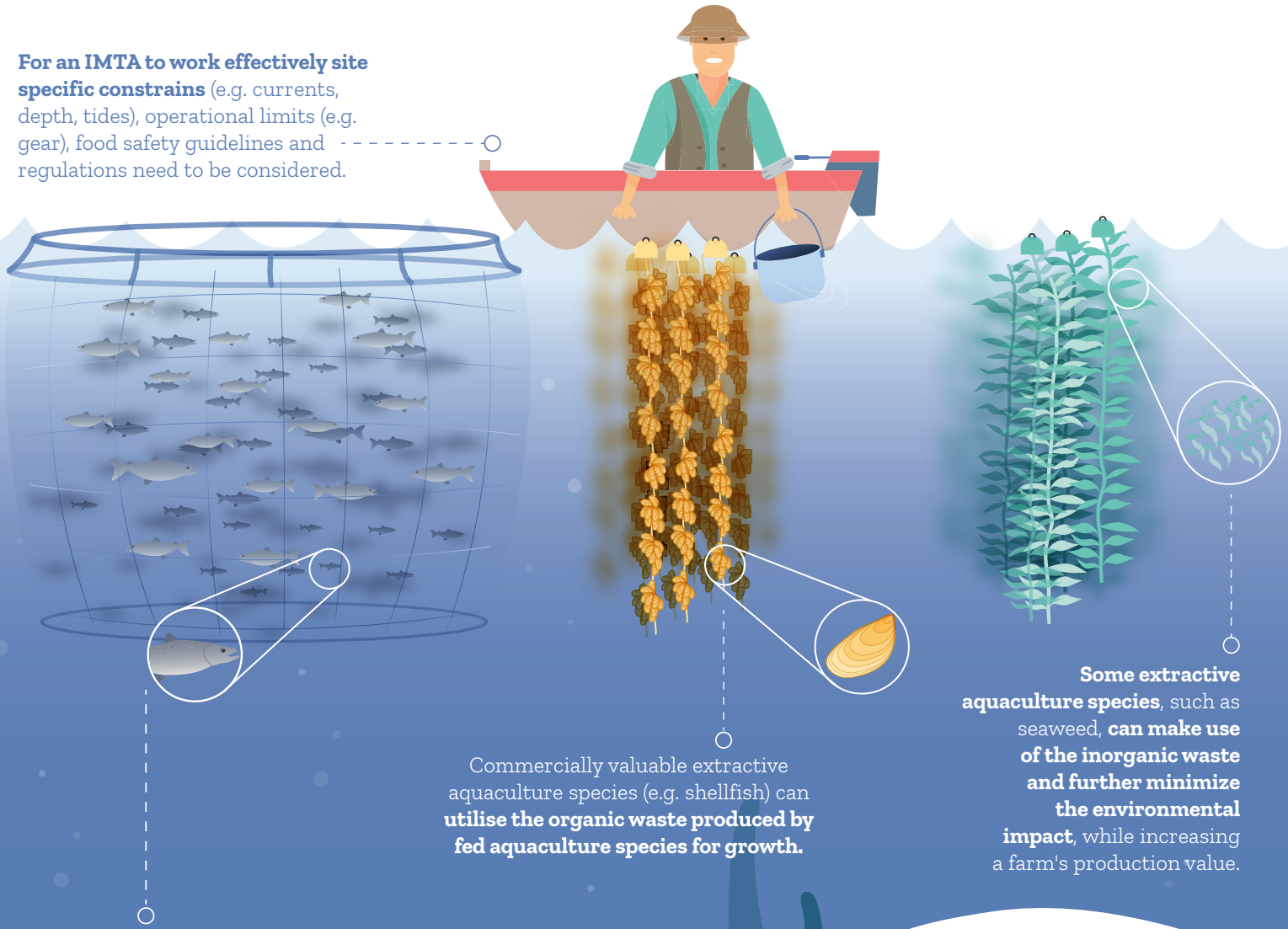
The idea behind IMTA stems from two key observations[1]:

In single-species fed aquaculture (e.g. finfish/shrimp) **the feed itself is one of the core operational costs**, but some of the nutritionally-rich feed may remain unutilized.

In natural ecosystems, species at different trophic levels in the food web (i.e. plants, herbivores, detritivores, predators) **utilize different food sources or re-purpose waste from other species.**

Through replicating the interconnectedness of nature, some of the food, nutrients and energy considered lost in monocultures are instead recaptured and converted into commercially valuable crops of commercial value, while mitigating the environmental impact.

For an IMTA to work effectively site specific constrains (e.g. currents, depth, tides), operational limits (e.g. gear), food safety guidelines and regulations need to be considered.



Aquaculture species do not assimilate 100% of their feed. **Some of the energy contained in feed is lost in the form of waste to the environment.**

Commercially valuable extractive aquaculture species (e.g. shellfish) can **utilise the organic waste produced by fed aquaculture species for growth.**

Some extractive aquaculture species, such as seaweed, **can make use of the inorganic waste and further minimize the environmental impact**, while increasing a farm's production value.

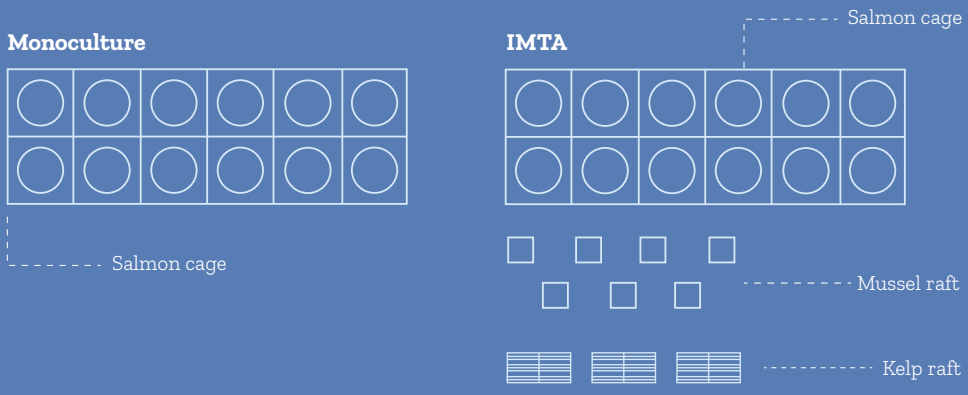
QUESTIONS WHEN CONSIDERING IMTA FOR YOUR FARM:

- Am I relying solely on the production of one species, or of multiple species from the same trophic level?
- What species could be raised in different trophic levels on my farm?
- Is my farm site conducive to IMTA, or could it be restructured appropriately?
- Will growing multiple species compromise my biosecurity plan?
- If you're thinking about IMTA on your farm, consult with the Maine Aquaculture Association or your local extension agent.

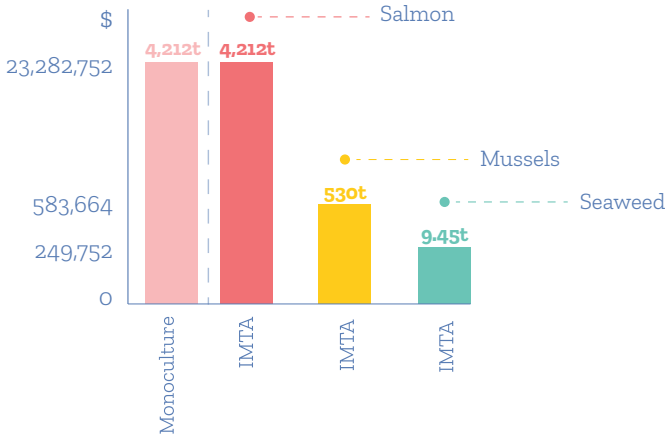
IMTA - a model with benefits to farmer and the environment

CASE STUDY[2]

A recent study in the Bay of Fundy (New Brunswick, Canada) compared hypothetical salmon (Salmo salar) monoculture production and revenue with that of an integrated multi-trophic aquaculture using salmon, mussels (Mytilus edulis) and kelp (Saccharina latissima).

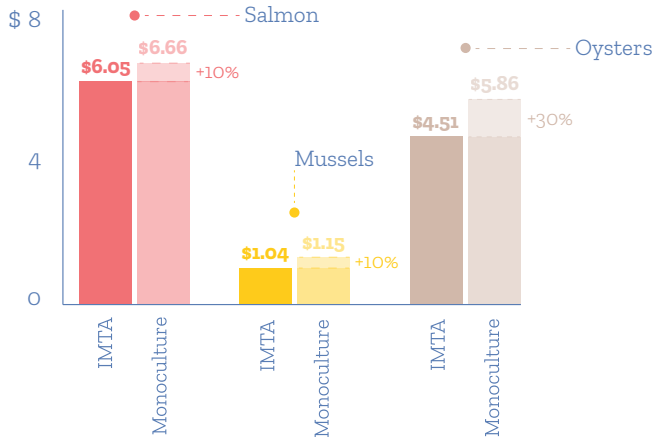


Predicted production and revenue *every two years



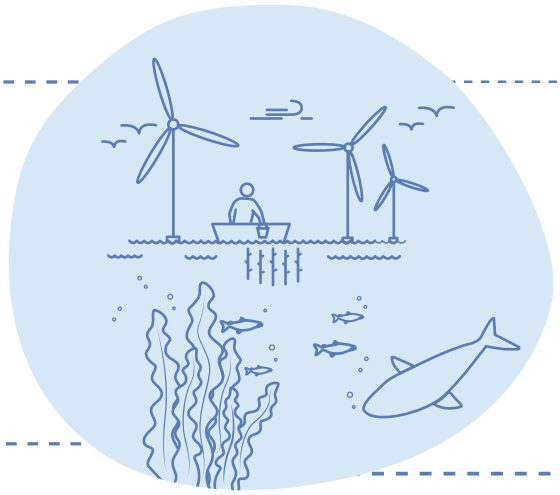
Market value and Price premium

Preference tests indicate that consumers are willing to pay a premium for IMTA products.



The goals of IMTA are to enhance environmental sustainability through biomitigation, economic stability through product and risk diversification, and social acceptability through better management practices[1].

Diversified product portfolio. Having too much production centered around a single species leaves a business vulnerable to changes in market value and natural occurrences (diseases, weather phenomena).



Increased and healthier production. Growth rates of kelps and mussels are 46% and 50% higher, respectively, than in monoculture. Well-designed IMTA systems may also control disease outbreak.[1].

The removal of feed waste and excretions via extractive species means a **reduced ecological impact.** By incresing underwater structure, IMTA farms provide **habitat and increase biodiversity.**

The future of IMTA could involve **multi-use systems,** such as the one in the German Bight, which integrate **turbot, kelp, and mussel production with offshore energy parks.**

Questions? Email christian@maineaqua.org

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[1]Soto, D. (ed.). Integrated mariculture: a global review. FAO Fisheries and Aquaculture Technical Paper. No. 529. Rome, FAO. 2009. 183p.

[2]Carras, M. A. et al. (2020) 'A discounted cash-flow analysis of salmon monoculture and Integrated Multi-Trophic Aquaculture in eastern Canada', Aquaculture Economics and Management. Taylor & Francis, 24(1), pp. 43–63. doi: 10.1080/13657305.2019.1641572.