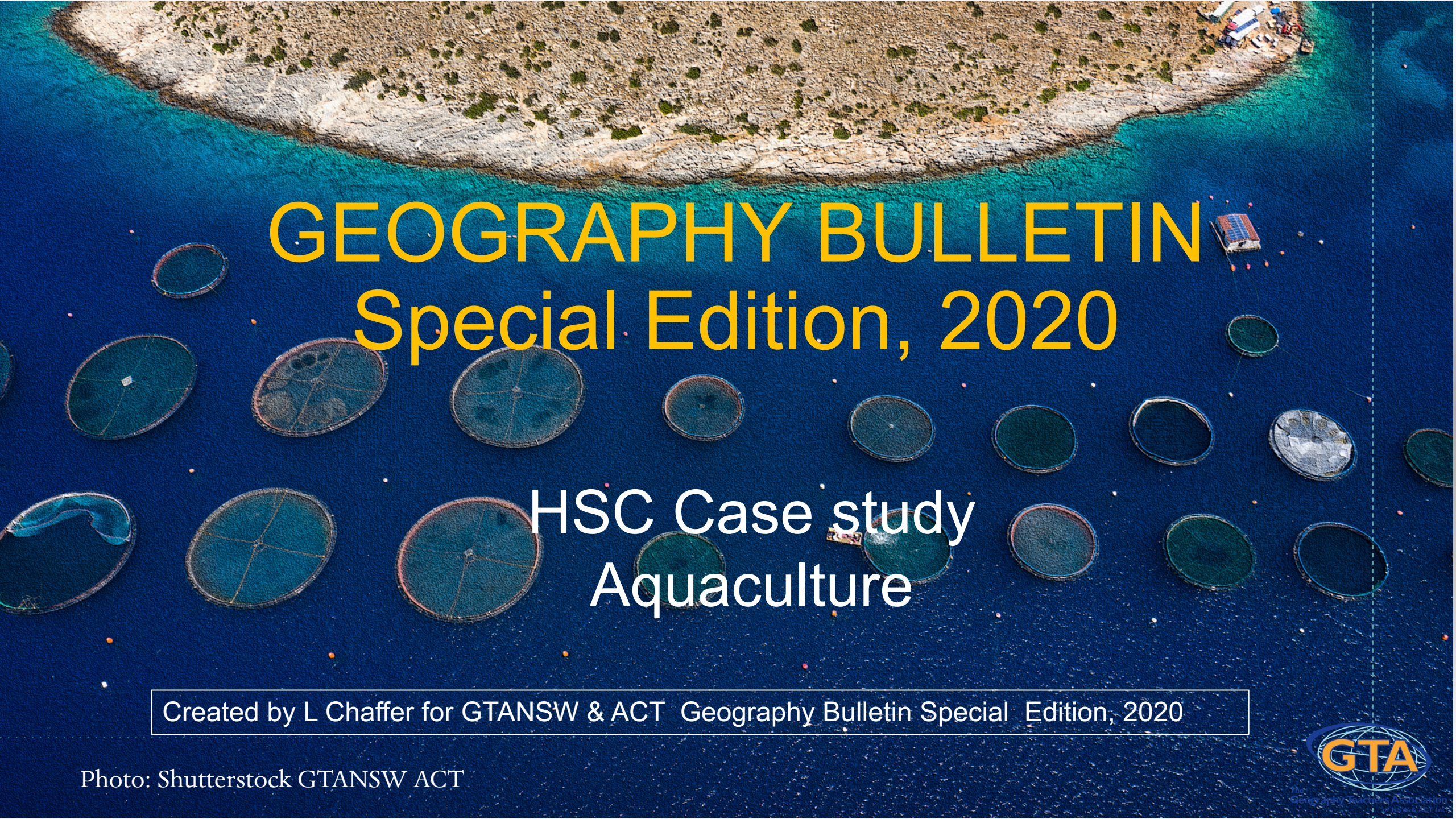




GEOGRAPHY BULLETIN

Special Edition, 2020

HSC Case study

Aquaculture

Created by L Chaffer for GTANSW & ACT Geography Bulletin Special Edition, 2020

Photo: Shutterstock GTANSW ACT



PEOPLE and ECONOMIC ACTIVITY

- Conversation starter

Why is aquaculture viewed as both an ecological saviour and an ecological villain of global seafood production?

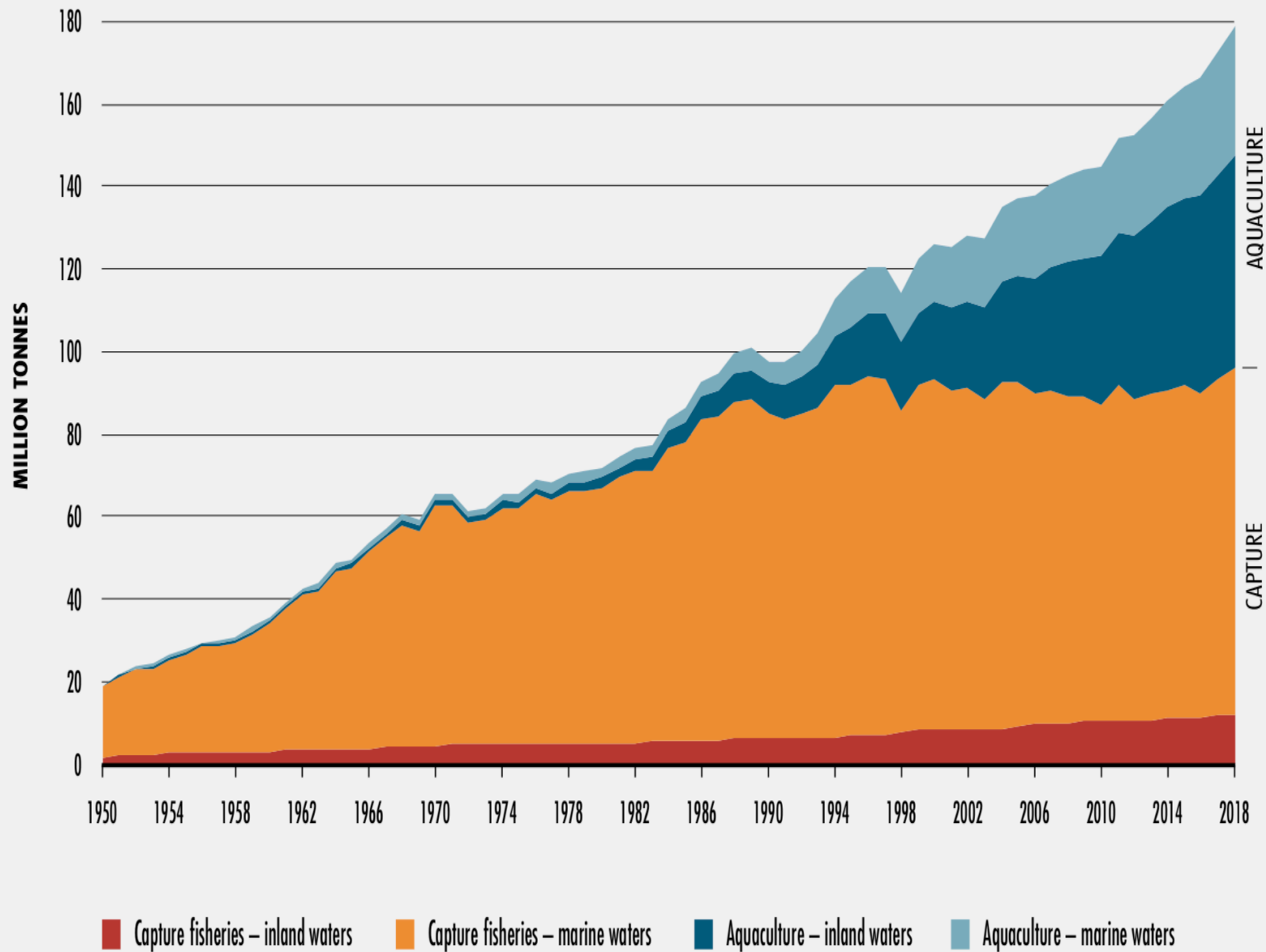
- Watch

Deep Sea Fish Farming with Geodesic Domes (10 minutes)

https://www.youtube.com/watch?v=NSZV_Ikrg0s

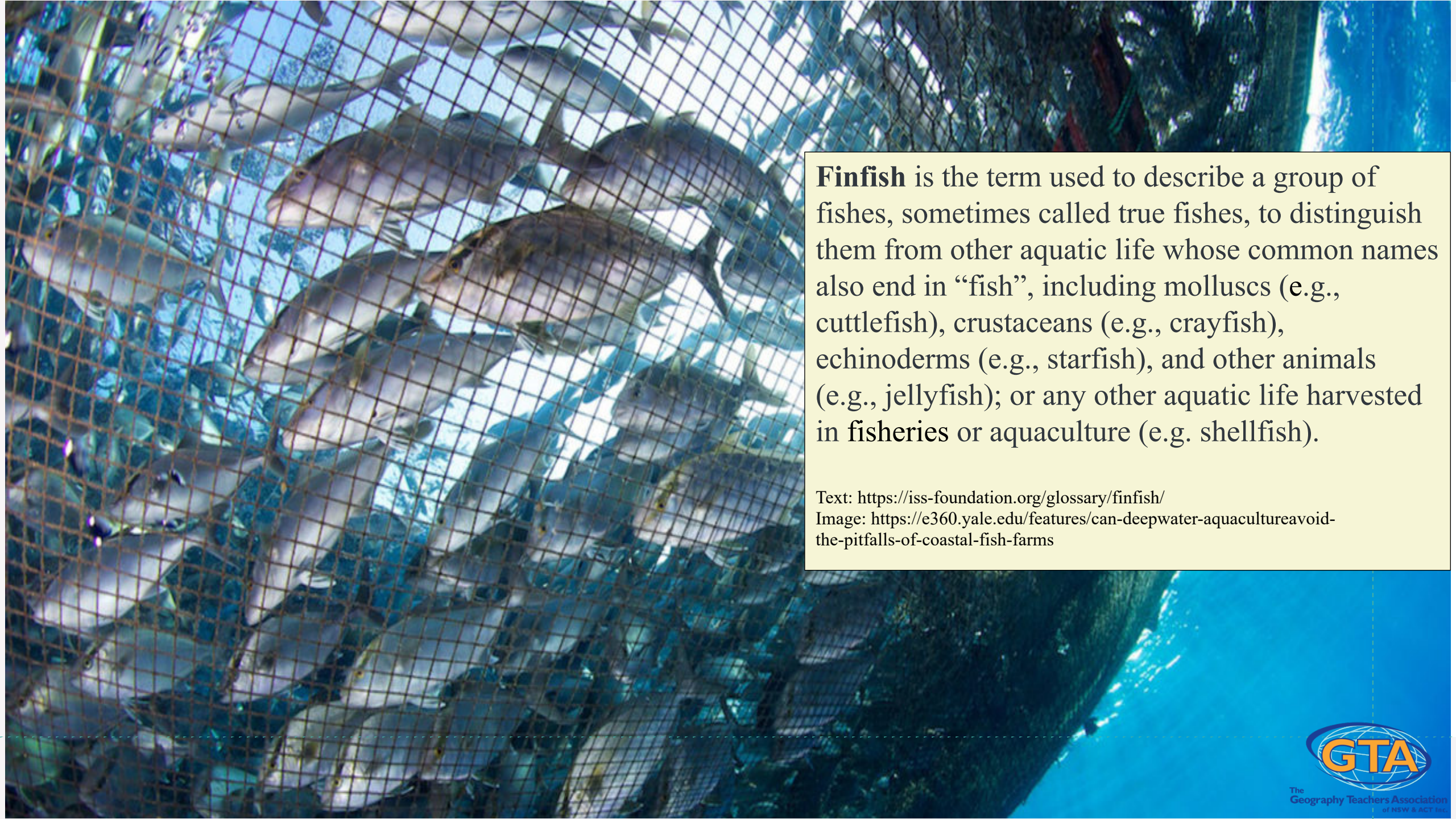
Farms under the sea could feed the world in 2050 (6 minutes)

<https://www.youtube.com/watch?v=Pm58yVMT3MY>



CURRENT TRENDS IN FISHERIES AND AQUACULTURE PRODUCTION

<http://www.fao.org/publications/sofia/en/>



Finfish is the term used to describe a group of fishes, sometimes called true fishes, to distinguish them from other aquatic life whose common names also end in “fish”, including molluscs (e.g., cuttlefish), crustaceans (e.g., crayfish), echinoderms (e.g., starfish), and other animals (e.g., jellyfish); or any other aquatic life harvested in fisheries or aquaculture (e.g. shellfish).

Text: <https://iss-foundation.org/glossary/finfish/>

Image: <https://e360.yale.edu/features/can-deepwater-aquacultureavoid-the-pitfalls-of-coastal-fish-farms>

Australian fisheries and aquaculture production 2018



Australian fisheries and aquaculture production



Aquaculture GVP increased by 5% to \$1.42 billion, accounting for 44% of total GVP*

Aquaculture volume increased by 4% to 97,672 tonnes, accounting for 36% of total volume*



Wild-catch GVP increased by 3% to \$1.79 billion, accounting for 56% of total GVP*

Wild-catch volume increased by 5% to 173,434 tonnes, accounting for 64% of total volume*

AUSTRALIAN SNAPSHOT

Per cent of total amount not adjusted for Southern Bluefin Tuna caught in the Commonwealth Southern Bluefin Tuna Fishery, as an input to farms in South Australia.
Source: ABARES

Source: ABARES <https://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-and-aquaculture-statistics/production-2018#gvp-increasesby-4-in-201718-to-318-billion>

Can you identify conditions required for cage aquaculture using this image?

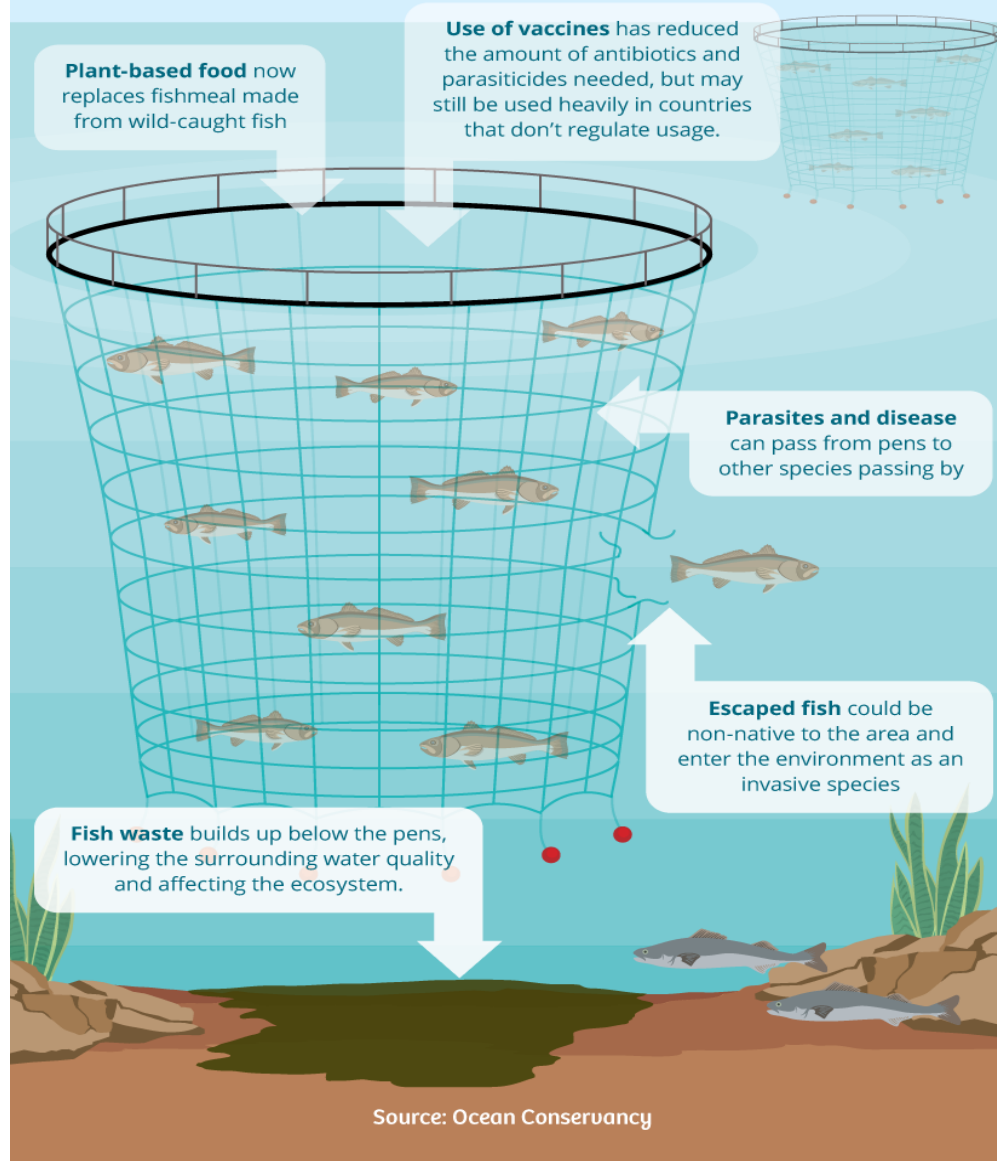


The new “blue revolution,” which has delivered cheap, vacuum-packed shrimp, salmon, and tilapia to grocery freezers, has brought with it many of the warts of agriculture on land: habitat destruction, water pollution, and food-safety scares. During the 1980s vast swaths of tropical mangroves were bulldozed to build farms that now produce a sizable portion of the world’s shrimp. Aquacultural pollution—a putrid cocktail of nitrogen, phosphorus, and dead fish—is now a widespread hazard in Asia, where 90 percent of farmed fish are located. To keep fish alive in densely stocked pens, some Asian farmers resort to antibiotics and pesticides that are banned for use in the United States, Europe, and Japan.

National Geographic: How to farm a better fish <https://www.nationalgeographic.com/foodfeatures/aquaculture/>

ECOLOGICAL IMPACTS

Impacts of Open Pen Aquaculture System



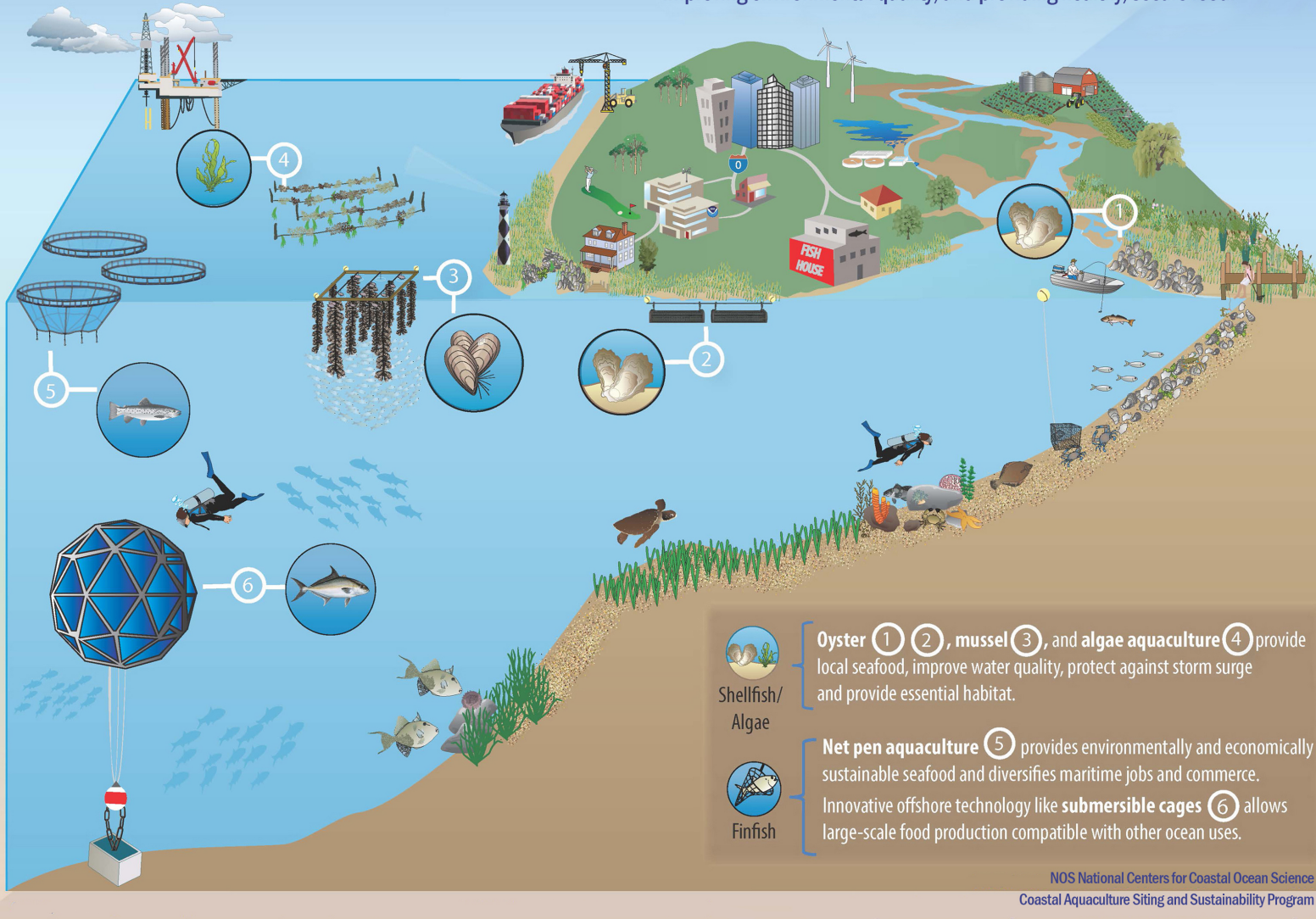
ECOLOGICAL IMPACTS

Environmental impacts of fish farming
<https://www.fix.com/blog/breakingdown-fish-farming/>



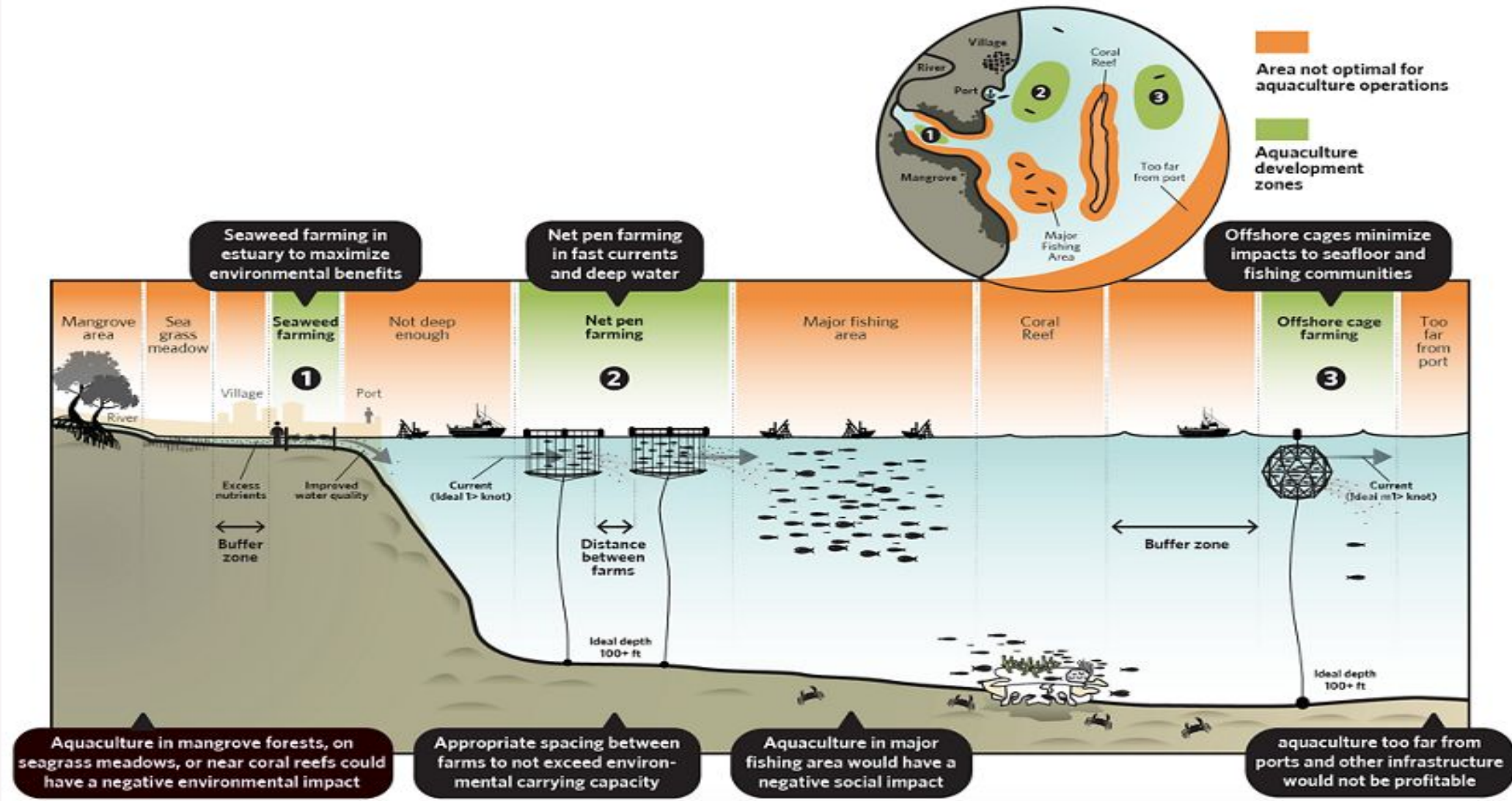
AQUACULTURE GROWS RESILIENT COASTAL COMMUNITIES

Marine aquaculture builds resilient coastal communities by growing waterfronts, improving environmental quality, and providing healthy, secure food.



POSITIVE IMPACTS

SITE CONSIDERATIONS for sustainability



Source: The Aquaculture Opportunity– <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/the-aquaculture-opportunity/>



SUSTAINABILITY

Giant Japanese scallops thrive on fish waste off Canada's Vancouver Island. The farm also uses sea cucumbers and kelp to consume excretions from nearby pens of native sablefish.

Source: National Geographic <https://www.nationalgeographic.com/foodfeatures/aquaculture/>

SUSTAINABILITY

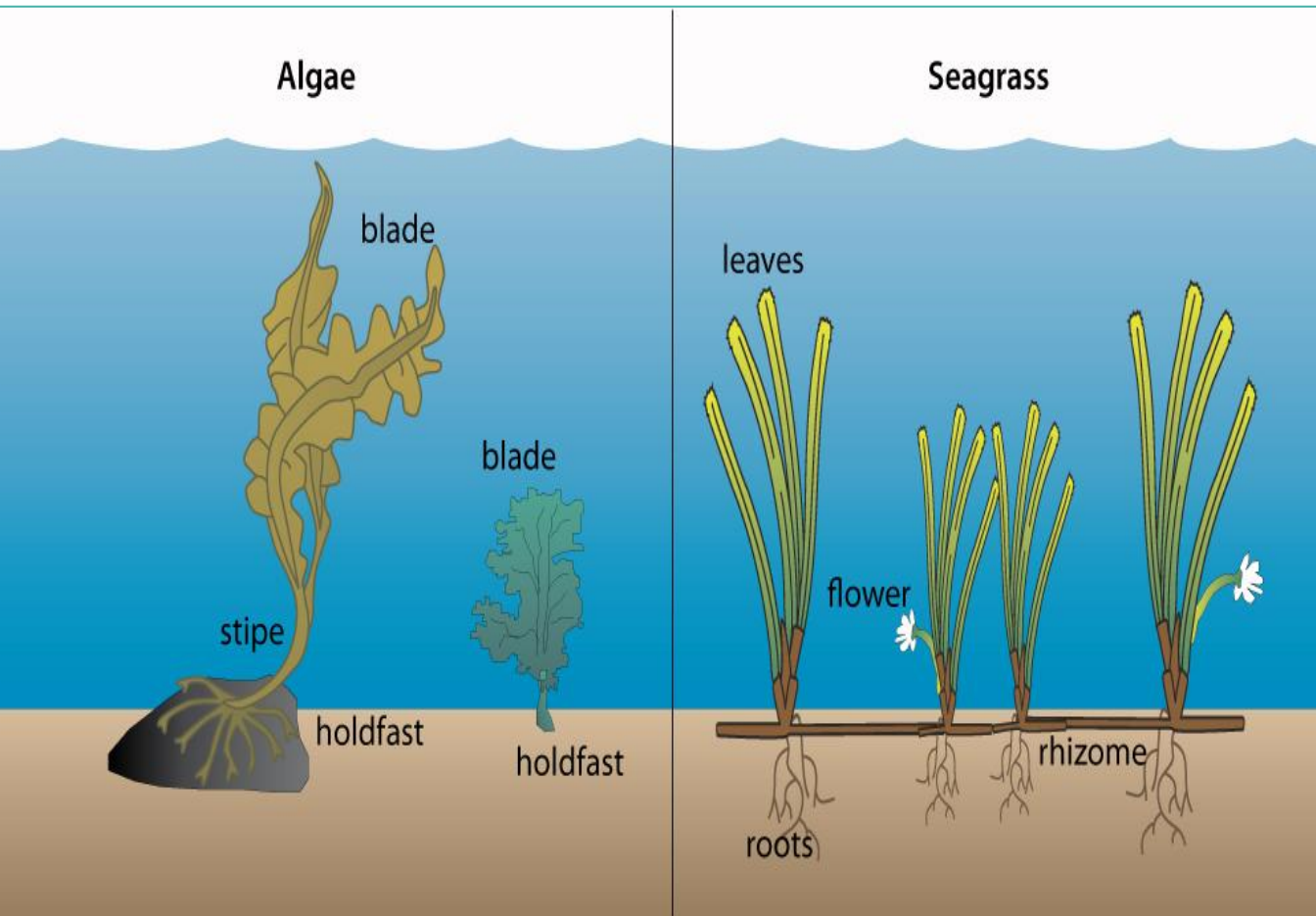


Source: <http://www.joycehuiart.com/featured02.php>
<https://www.dfo-mpo.gc.ca/aquaculture/sci-res/imta-amti/imta-amti-eng.htm>

Seaweed Aquaculture What's happening here?



Photo: Shutterstock GTANSW ACT



Algae vs seagrass – <https://ocean.si.edu/holding-tank/images-hide/algae-vs-seagrass>

What is seagrass? – <https://www.thoughtco.com/what-is-seaweed-2291912>

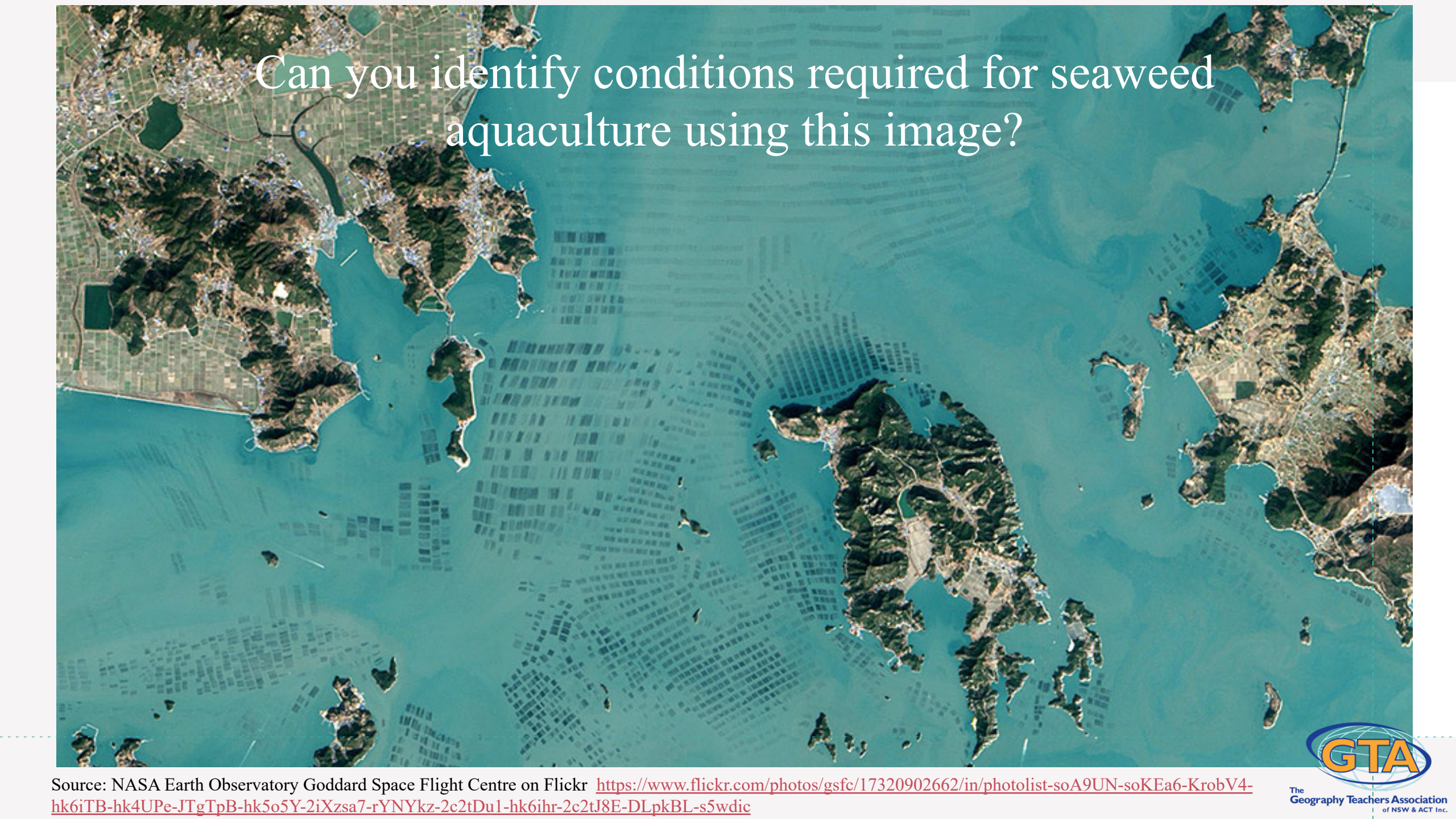
‘Algae are classified into three groups: red, brown, and green algae. While some algae have root-like structures called holdfasts, algae do not have true roots or leaves. Like plants, they do photosynthesis, but unlike plants, they are single-celled. These single cells may exist individually or in colonies.’

Can you identify conditions required for seaweed aquaculture using this image?



Credit Leyo /Wikimedia Commons/CC BY-SA 2.5 CH

Source: THE WORLD <https://www.pri.org/stories/2016-09-24/seaweed-industry-booms-how-can-we-farm-seaweed-more-sustainably>

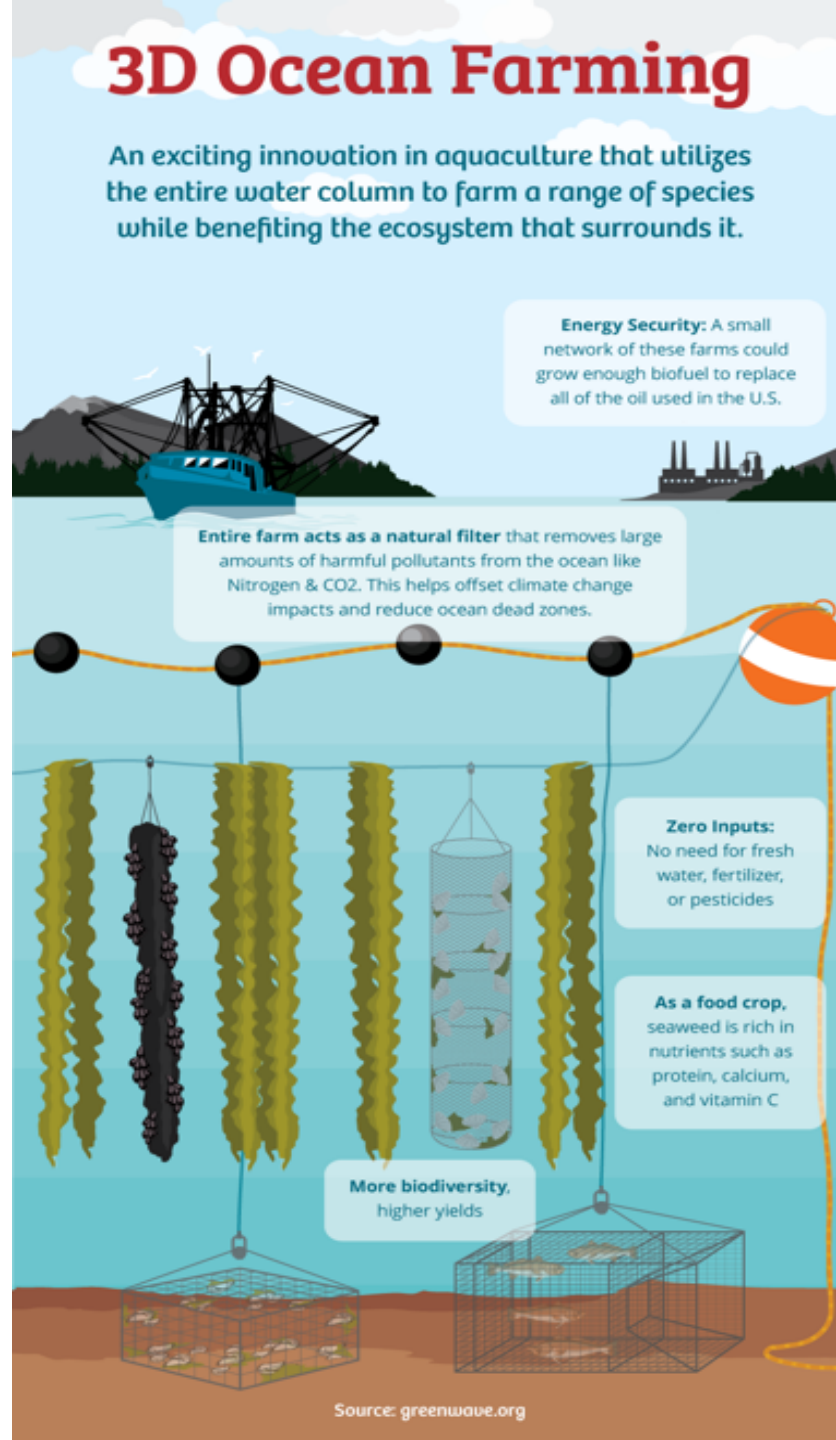
A satellite image of a coastal region, likely in Japan, showing extensive seaweed aquaculture. The water is a deep blue-green, and the land is a mix of green and brown. The aquaculture is visible as a dense grid of dark, rectangular structures in the water. The text "Can you identify conditions required for seaweed aquaculture using this image?" is overlaid in white, serif font.

Can you identify conditions required for seaweed aquaculture using this image?

Source: NASA Earth Observatory Goddard Space Flight Centre on Flickr <https://www.flickr.com/photos/gsfcr/17320902662/in/photolist-soA9UN-soKEa6-KrobV4-hk6iTb-hk4UPe-JTgTpB-hk5o5Y-2iXzsa7-rYNYkz-2c2tDu1-hk6ihr-2c2tJ8E-DLpkBL-s5wdic>



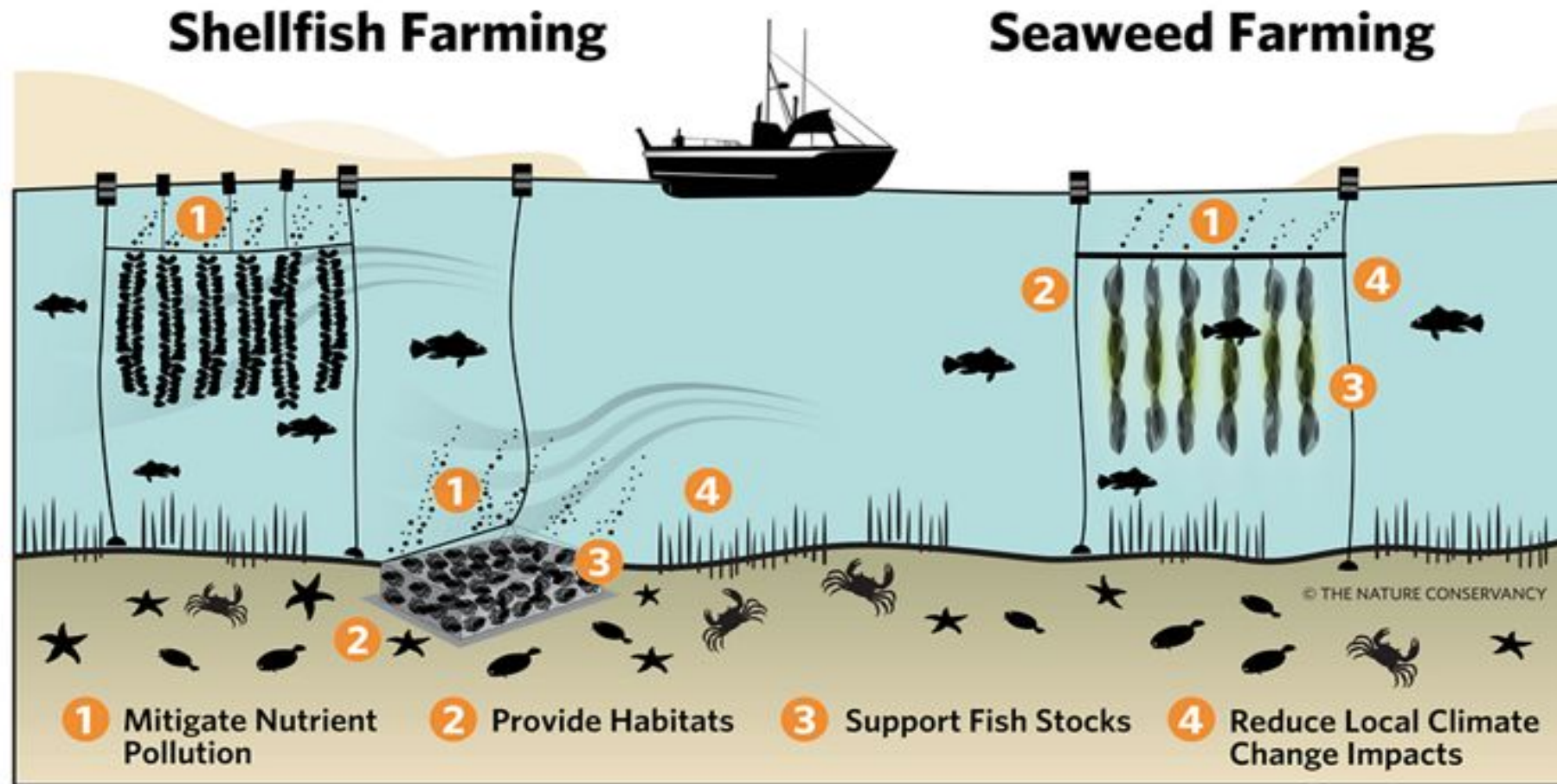
The
Geography Teachers Association
of NSW & ACT Inc.



How can 3D seaweed production contribute to a sustainable aquaculture industry that benefits the environment?

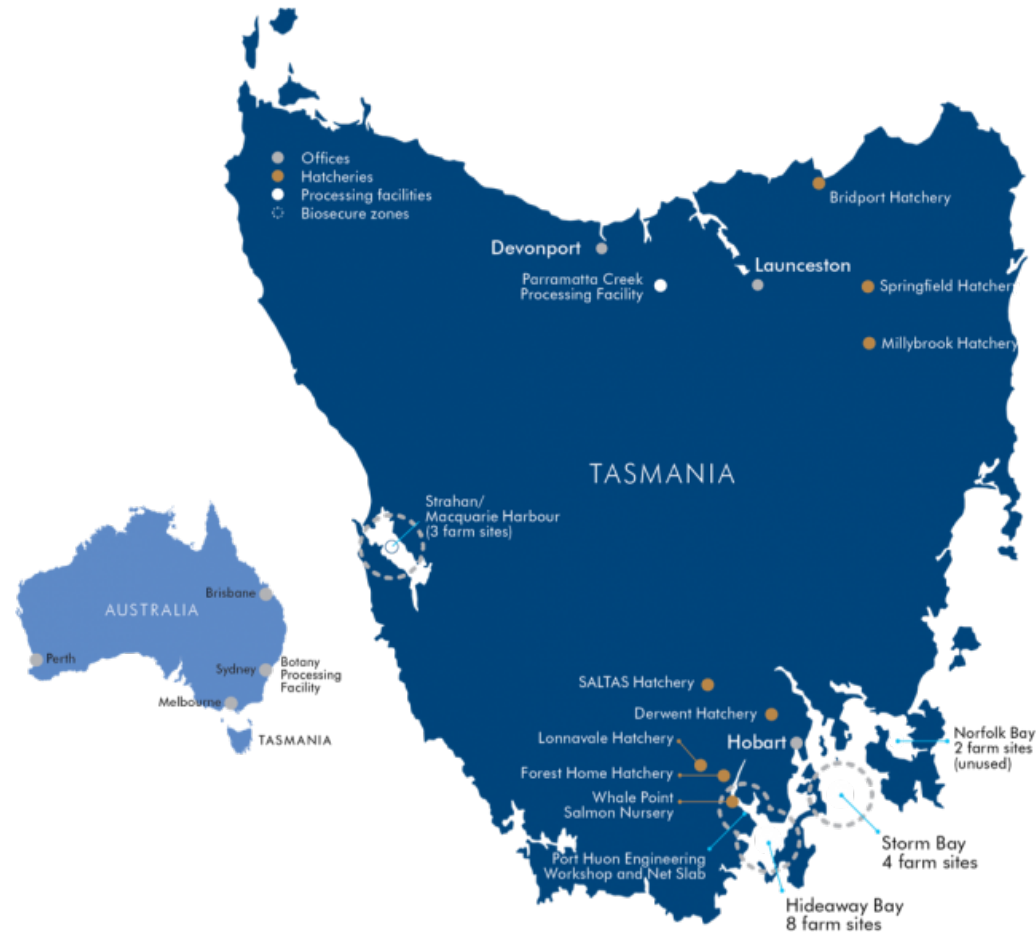
Source: <https://www.fix.com/blog/breaking-down-fish-farming/>

How can seaweed contribute to sustainable aquaculture that benefits the environment?



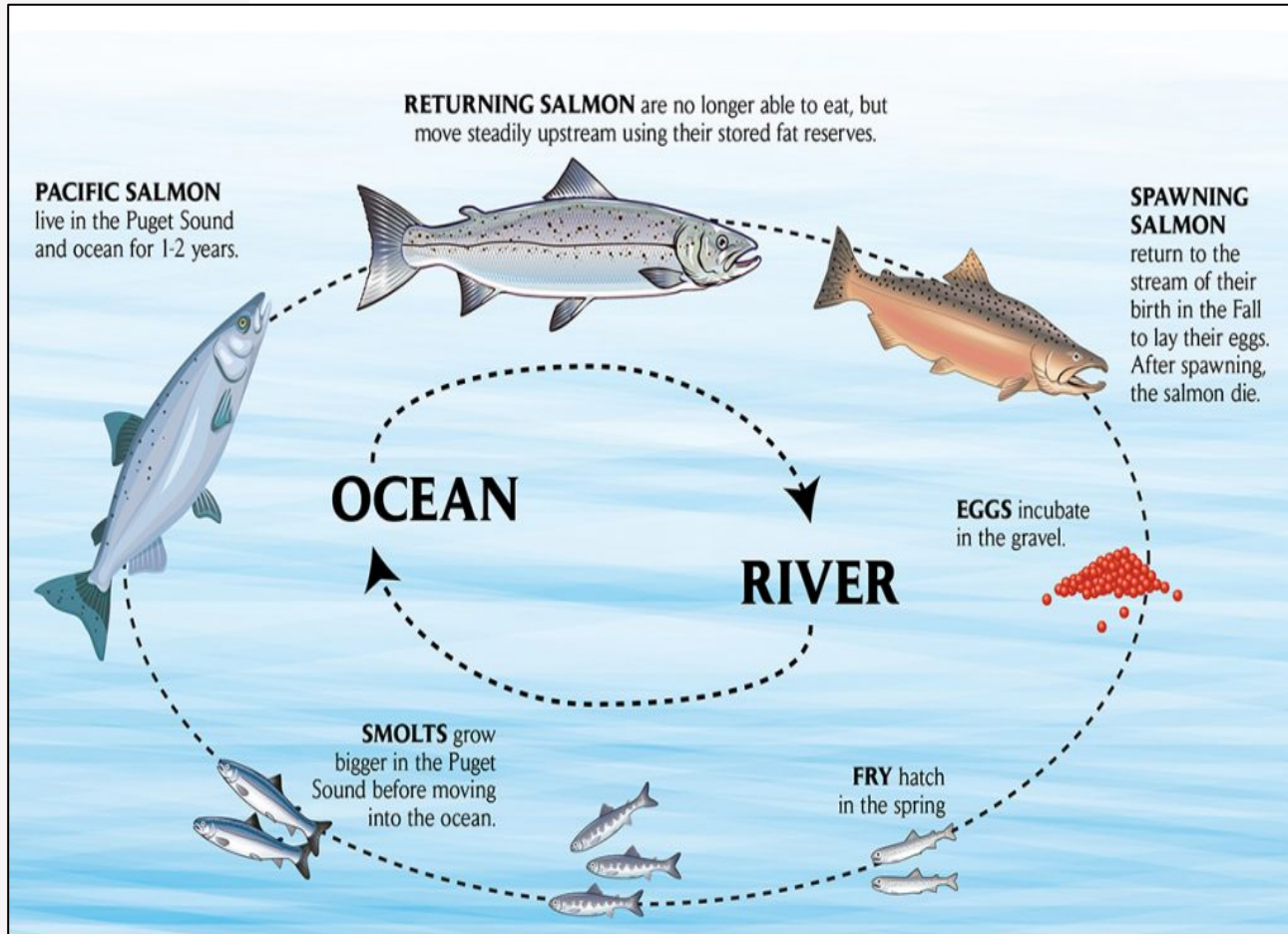
Source: Catalysing the Blue Revolution: How Investors Can Turn the Tide on Aquaculture, NATURE – <https://www.nature.org/en-us/what-we-do/our-insights/perspectives/how-investors-can-turn-the-tide-on-aquaculture/>

HUON AQUACULTURE



Source: Huon aquaculture <https://www.huonaqua.com.au/about/operations/>

What are the environmental conditions that need to be replicated to farm salmon?



WATCH

The Life Cycle of the Atlantic Salmon animation (5 minutes)

<https://www.youtube.com/watch?v=2fGLzEvWuYA>

OR

Life cycle of the salmon (6 minutes)

<https://www.youtube.com/watch?v=nlSoUXfjEeQ>

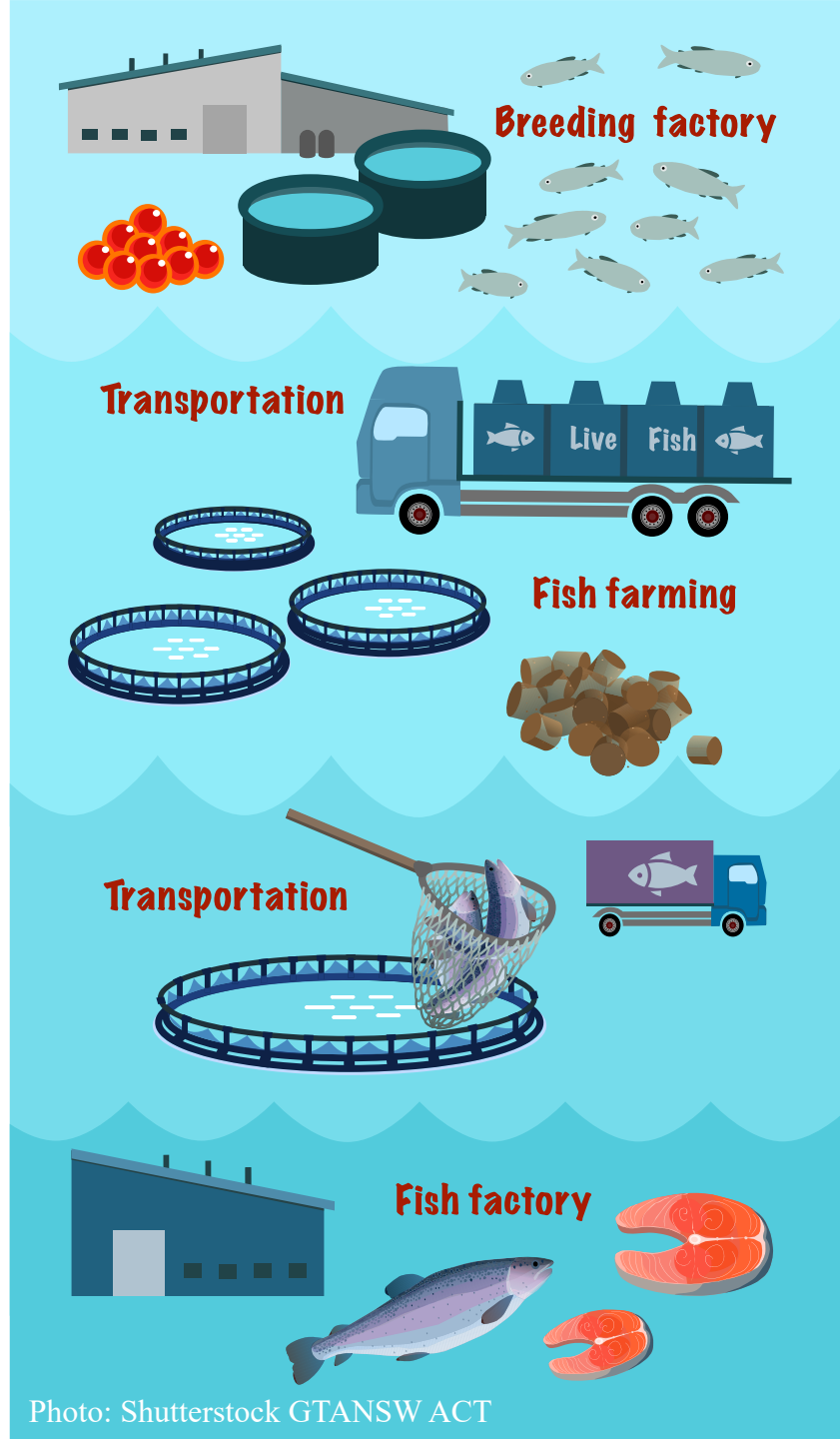
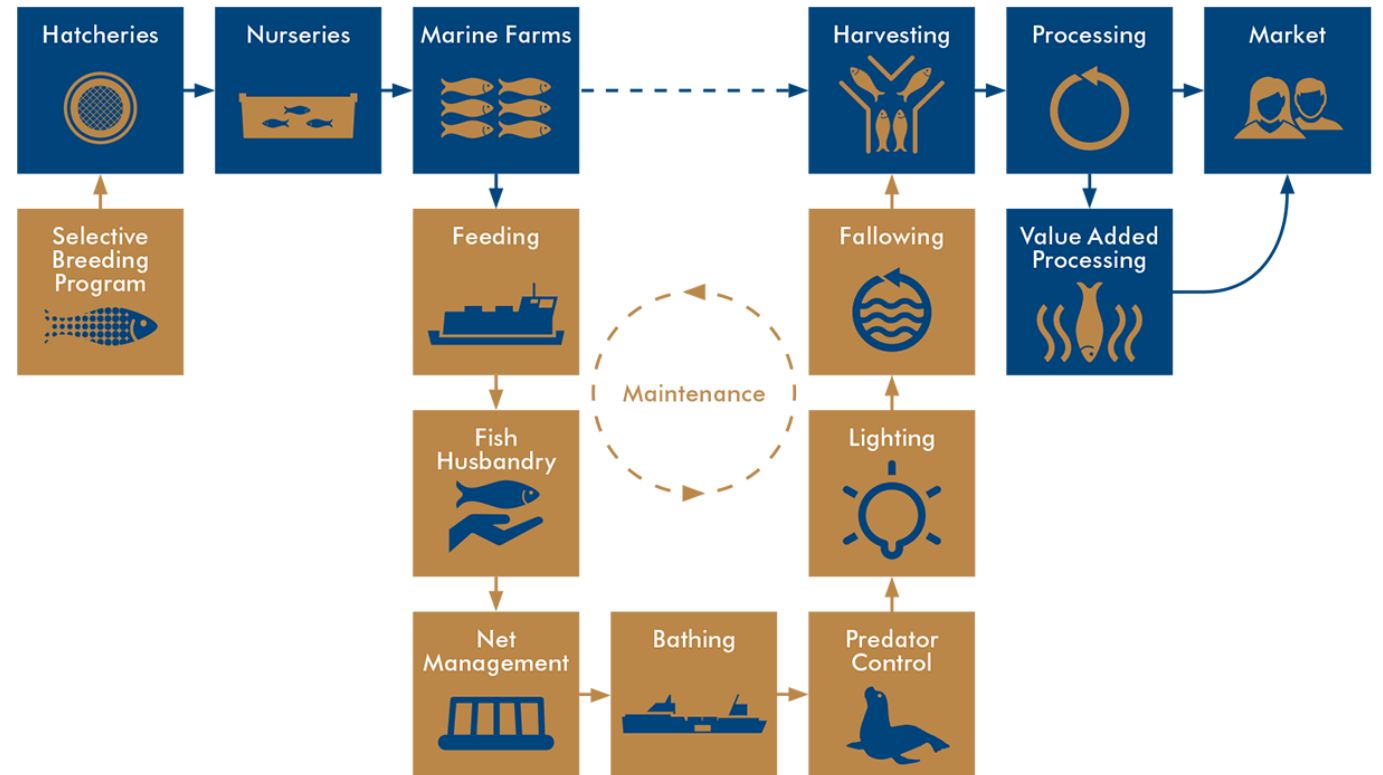


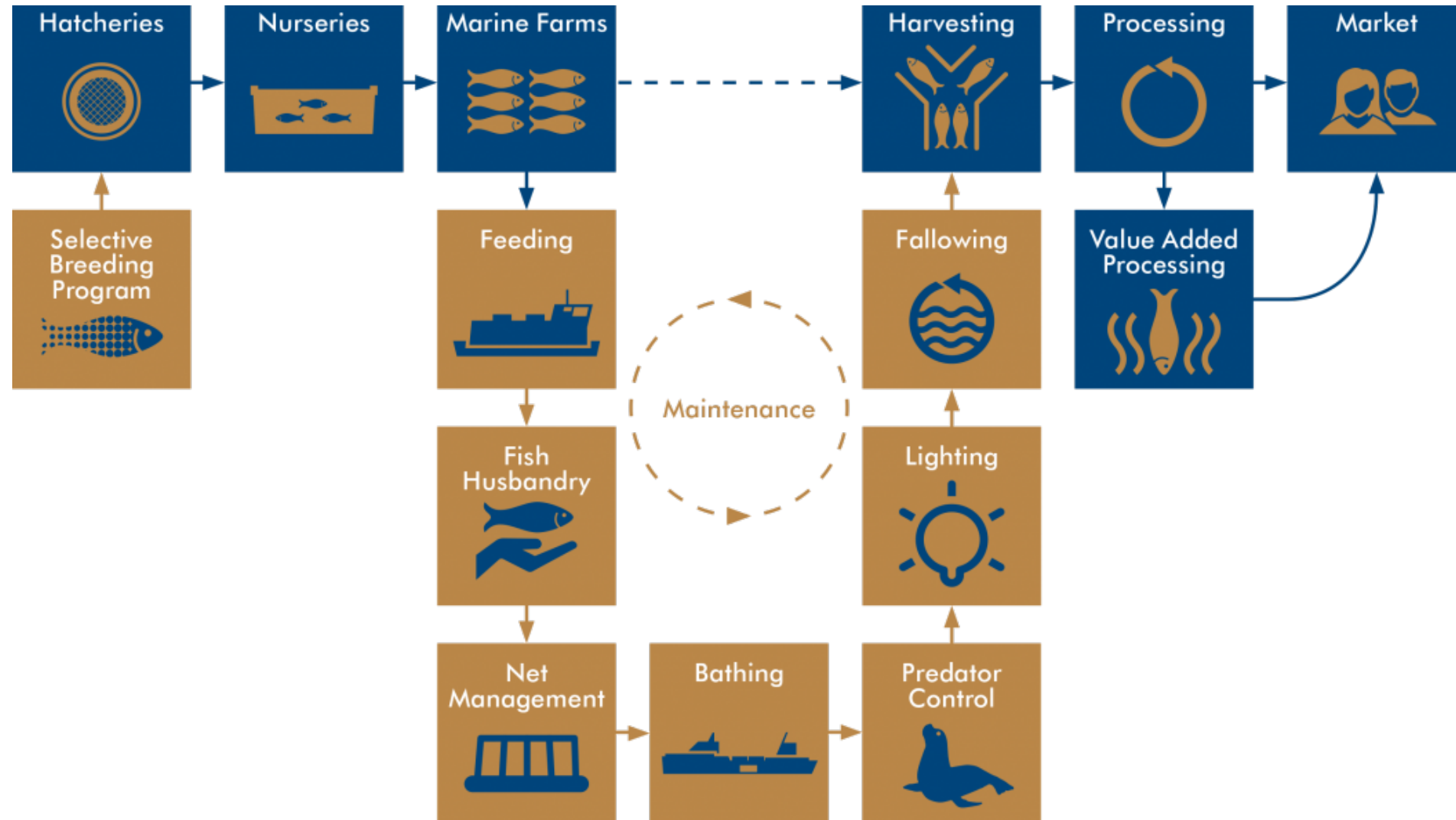
Photo: Shutterstock GTANSW ACT

HUON AQUACULTURE : VERTICAL INTEGRATION



http://investors.huonaqua.com.au/FormBuilder/_Resource/_module/y8hXOIgfx0a4WjS UgjZk7A/docs/Reports/Annual/2017/HTML1/what_we_do.htm

HUON AQUACULTURE : VERTICAL EXAGGERATION

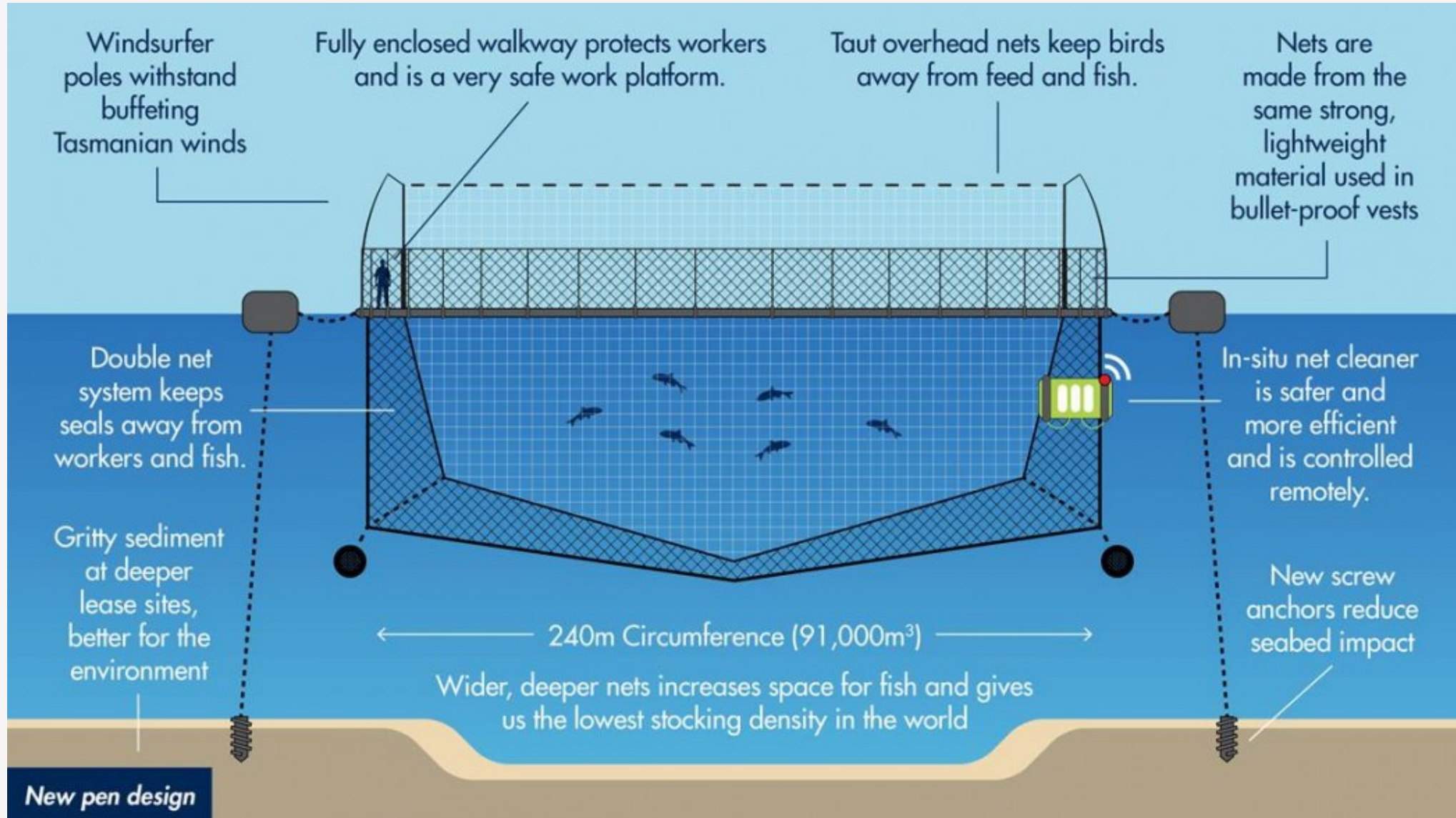


HUON AQUACULTURE : INLAND OPERATIONS / HATCHERIES



<https://www.huonaqua.com.au/our-approach/our-operations/freshwater-operations/>

HUON AQUACULTURE : OFFSHORE OPERATIONS / SEA PENS



HUON AQUACULTURE

OFFSHORE OPERATIONS



FORTRESS PENS

240m circumference double-netted pens that are the biggest in the world.

Wildlife safety: Seals are prevented from entering the pens which means that they are unable to become trapped. The double-netted design and material discourages birds from resting on the pens and prevents them from accessing fish feed, reducing the likelihood of bird entanglements.

Reduced environmental impact: Waste from the fish in the larger pens is dispersed over a bigger area and the natural biota can then digest any waste as it is generated making it easier for the environment to naturally "process" it.

Employee safety: The flat, enclosed walkway of the new pens provides a safer and more stable work platform for farm workers particularly in bad weather. Seals are also unable to access the walkways, reducing the likelihood of aggressive seals interacting with employees.

Marine debris: The new pens cope well with extreme weather which means that debris caused by weather is minimised.

IN-SITU NET CLEANING

Reduced potential for marine debris: Nets are not typically removed from pens for cleaning which in turn reduces the opportunity for marine debris to be created, additionally, less rope used in the new pen design reduces potential for rope to be lost from the pen.

Improved health and welfare: In-situ cleaning enables more regular cleaning of nets which improves water flow and reduces stress on the fish.

WELL-BOAT

State of the art vessel for bathing fish in freshwater, transporting fish to harvest and smolt (juvenile salmon) to sea.

Reduced stress on fish during freshwater bathing: The well-boat makes the process of bathing and transporting fish far less stressful, thus improving their welfare.

Improved safety for workers: It provides a safer working platform for workers undertaking bathing operations during adverse weather.

Reduced community impact: It undertakes a range of functions and means that we have almost eliminated towing of pens and reduced the need for higher numbers of smaller, noisier vessels to be moving around the waterways.

Reduced freshwater use: The Ronja Huon re-uses freshwater at least four times compared to single use for traditional bathing methods.

Improved biosecurity: By transporting all fish in an enclosed system that can be sterilised, the potential for disease transfer is reduced.

MOORINGS

New heavy duty moorings support the new Fortress Pens.

Safer and more secure moorings: Allows the pens to be moored safely in higher energy sites.

FEEDING TECHNOLOGY

We have developed next generation pellet recognition video technology which has been rolled out across our feed barges. The pellet recognition video technology enables us to monitor high quality video and continuous sensor information from across all of our pens. Due to a lack of suitable technology in the market Huon has developed and is now implementing cutting edge Wi-Fi technology which is able to connect network sensors over long distances on our offshore leases.

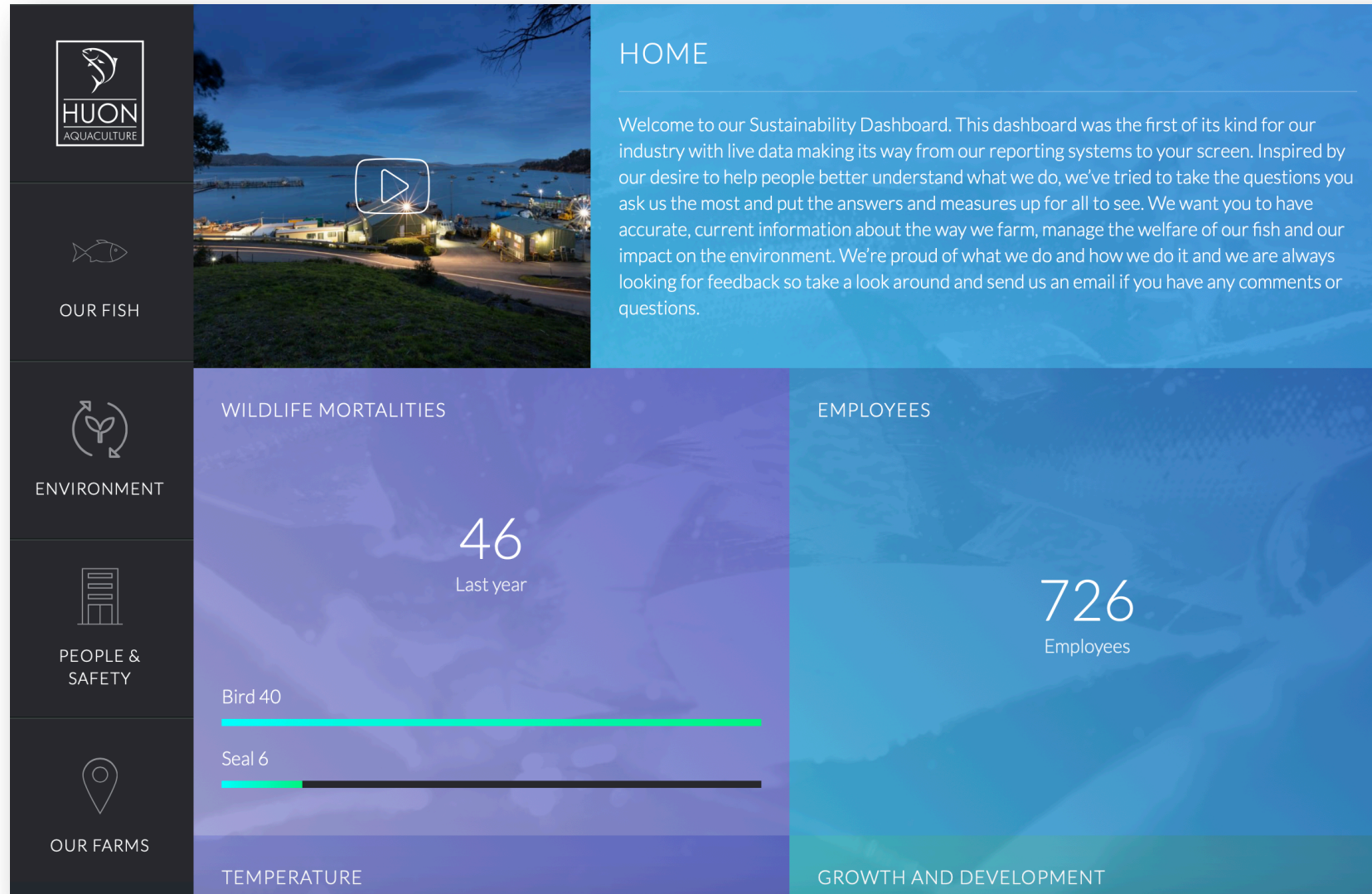
Improved health and welfare of fish: All fish can be fed at the same time and watched remotely using the new system to identify any signs of stress or disease.

Reduced impact on the environment: We can feed fish strictly to appetite with reduced potential for feed to fall to the seafloor.

Improved safety for workers: Remote operation of the system means staff can monitor fish and feed without risk during extreme weather.

<https://www.huonaqua.com.au/our-approach/our-operations/>

HUON AQUACULTURE: SUSTAINABILITY DASHBOARD



Can you identify the 3 pillars of sustainability) Social, economic, environmental) on the Sustainability Dashboard?

<https://www.huonaqua.com.au/our-approach/sustainability/>