MARINE ENVIRONMENTAL RECI R CULATION WATER AQUACULTURE TREATMENT SYSTEM (MERWATS™)

Bringing all Players to the Table
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Presented by Robert Bishop
Atlantic Pacific Marine Farms LLC Maine, USA
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WHY.

To use a MARINE ENVIRONMENTAL RECIRCULATION WATER AQUACULTURE TREATMENT SYSTEM (MERWATS™), its design to help in the long term issues of the changes in the world ocean which are playing out on the world stage. While its not the answer to everything in aquaculture it will help in terms of hatcheries, high value products, brood stock control etc, for the future of growing aquaculture in 21st century.

Ongoing debate on global climate change, increased foreshore erosion by more violent and often unseasonal storms, increased demand and higher prices for coastal lands, increase atmospheric CO2 leading to lowered ocean pH.

We are also experiencing increasing pressure from local, state, and national governments, local interest groups and the natural environment itself on any aquaculture enterprise that operates on or near the ocean.

These present increasing technical and legal challenges for integrated businesses that grow marine species to operate hatcheries, growouts etc, that can provide the quantity and quality of seed animals or seafood products as required.

So under these circumstances, the seafood culture industry has some major issues to face for long-term growth.

Our solution to these challenges has been to mimic nature in providing optimum conditions for a 21st-century aquaculture farm. This will move the industry forward, and, in the long term, change our ways of working. Making these changes is not necessarily the easiest or cheapest option, but by using appropriate technology we can achieve good results for the right seawater species.

River major flooding that had impact on intake 17 km away

Pacific ocean intake design for 6000 m³ 24 hours
MARINE = Design to function in one of the most hostile environments for plant and equipment.

ENVIRONMENTAL = Reduce the impact of raw resources; make better use of the natural resources required, while improving the business profit.

RECIRCULATION = Reuse as much as possible the water and resources in the system.

WATER = Seawater in the system to bring and maintain life for marine species.

AQUACULTURE = The farming of fish products.

TREATEMENT = The taking of the discharge waste and cleaning it in order to be reused again and therefore lower the impact of wasted resource on the business and environment.

SYSTEMS = The combination of all the elements to function as one.

Or as I call it or (MERWATS™)
In brief a MERWATS™ works as follows.

1. The building is made of freezer panel to keep the temperature the same all year which has better R value than normal building material. With aluminum wall coverage this makes the farm easy to wash down keeping the farm cleaner and faster to put up.

2. Since the farm uses seawater we can use fresh water to clean all equipment without using harsh chemicals.

3. Using a Geothermal and solar system for temperature / power control help greatly cut down on the electrical cost.

4. By using new technology we can monitor, control and maintained all our parameters to achieve a better product while making less need for imported materials to the farm.

5. Rain water from the roof of the building helps make up the loss in the normal farming environment and cleaning. Even in a 50% less rain fall than normal for Maine will still save us 68% in water cost pumping and taking of ground water.

On land MERWATS™ is part of a total package will help to minimize the use of natural resource and improve productive and profit.
MERWATS™ Skid has can handle seawater flow up to 85 m³ per hr and up to 6000 kg per line of production depending on operational requirements and species.

- Vortex filters
- Sump holding 12 m³ total
- Bio filters
- PS with ozone
- Pumps
- Carbon filters
- Calcium reactor
- 10 & 50 µm filters
- UV
- Oxygen system
- Degassing tower
- IMCS controls
- All waste is cleaned and return to sump.
Layout of MERWATS

Rack/tray system starting to be set up

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Setting up a Mears system

Part 1 of system up

Abalone in system

Putting trays in 10m long

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MERWATS™
Waste part of the system

- Geo tube waste holding system
- Polymer mixing to bind feed etc
- Ozone
- UV
- Bio bead filter
- IMCS 12 points
- Reusing up to 90% of our water

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Industrial Measurement Control System (IMCS)

Real time data
Data from the IMCS

• IMCS gives us real time data
  • Reading are taken every 30 sec 24/7 (more or less if needed)
• Data only records change so you see the different
• PC anywhere means you can control any place in the world
• Know what's happen when you asleep
• Will make fuzzy logic decision if programmed
• Will control all equipment and system to max company returns

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**Abalone**

Abalone is the American English variant of the Spanish name [Abulón] used for various species of shellfish (mollusks) from the Haliotidae family (genus *Haliotis*). Abalones are members of a large class (Gastropoda) of mollusks having one-piece shells. They belong to the family Haliotidae and the genus *Haliotis*, which means sea ear, referring to the flattened shape of the shell.

The number of species range from about 100 to about 130 species (due to the occurrence of hybrids), characterized by a richly colored (on the inside--the outside is rough and mostly brown) shell yielding mother-of-pearl.

The muscular foot has strong suction power permitting the abalone to clamp tightly to rocky surfaces. An epipodium, a sensory structure and extension of the foot that bears tentacles, circles the foot and projects beyond the shell edge in the living abalone.

**Ezo Awabi abalone** (*H. discus hannai*)

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Standard Operational Procedure (SOP) for abalone or other marine aquaculture industry

The following is a list of Standard Operational Procedure (SOP) for abalone and other marine aquaculture industry.

1. Working on abalone farm.
3. Abalone hatchery.
4. Abalone diseases
5. Management of abalone farm
7. *MERWATS™ for aquaculture
9. **Best environmental practices for aquaculture.
10. **Operational systems for aquaculture

NB: No marks mean the SOP is for abalone farming only
* MERWATS™ only and can be either abalone or any other other marine aquaculture farming
** general aquaculture industry

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Investment into MERWATS™

Company and staff have a greater return on both their investment of time and money

Quality consumer Fish products

Better quality health of fish products

Better for the Aquaculture Business

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Atlantic Pacific Marine Farms Ltd would like to thank our industry partnerships in new research joint projects, new product development, grant funding, and ongoing support.

Aquaculture Research Institute, University of Maine.