

Semi-closed pen systems: Strengths and weaknesses concerning fish health



“Aquatrax”



Trondheim, Aug 14th 2017

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Midt-Norsk Havbruk AS

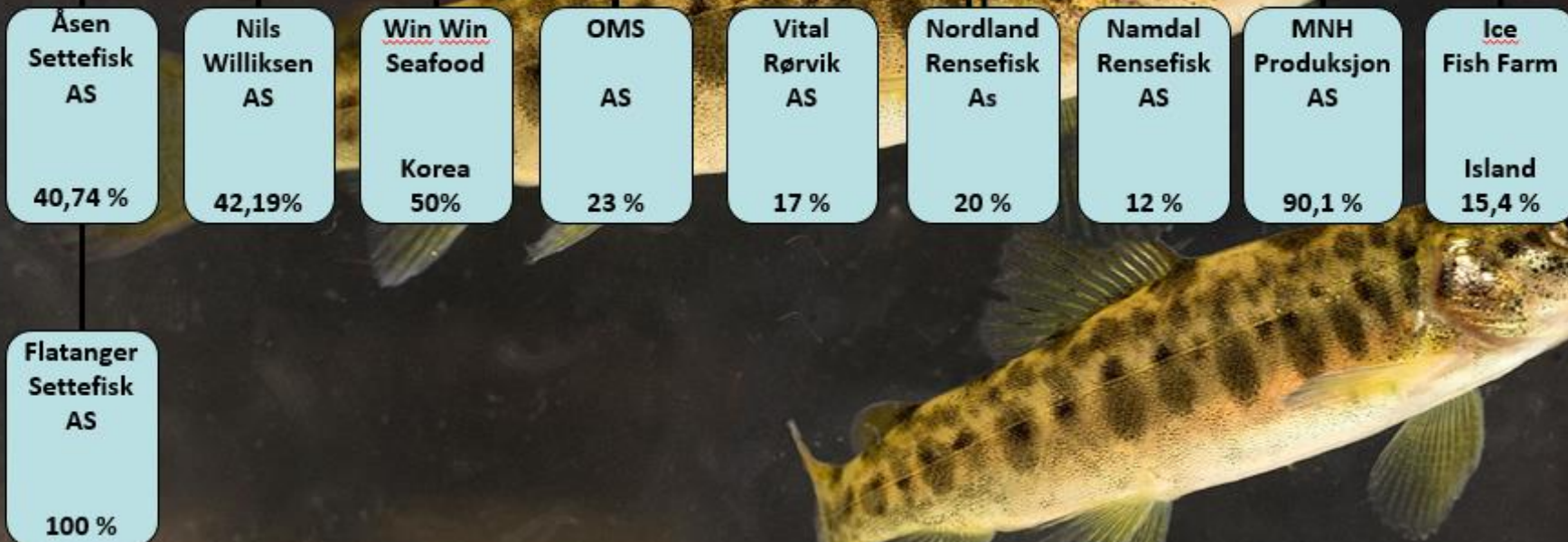
Midt-Norsk Havbruk AS

- From egg to full-sized farmed salmon
- Strong cooperation with Bjørøya AS
- Together with Bjørøya AS the production is about 26.000 tons gutted salmon



Midt-Norsk Havbruk (Morselskap NTS ASA)

Midt-Norsk Havbruk AS



Development from 2002

Utvikling



THE «MIDT-NORSK- RING»

**Good environment-
change in behavior**



It isn't always like
this.....

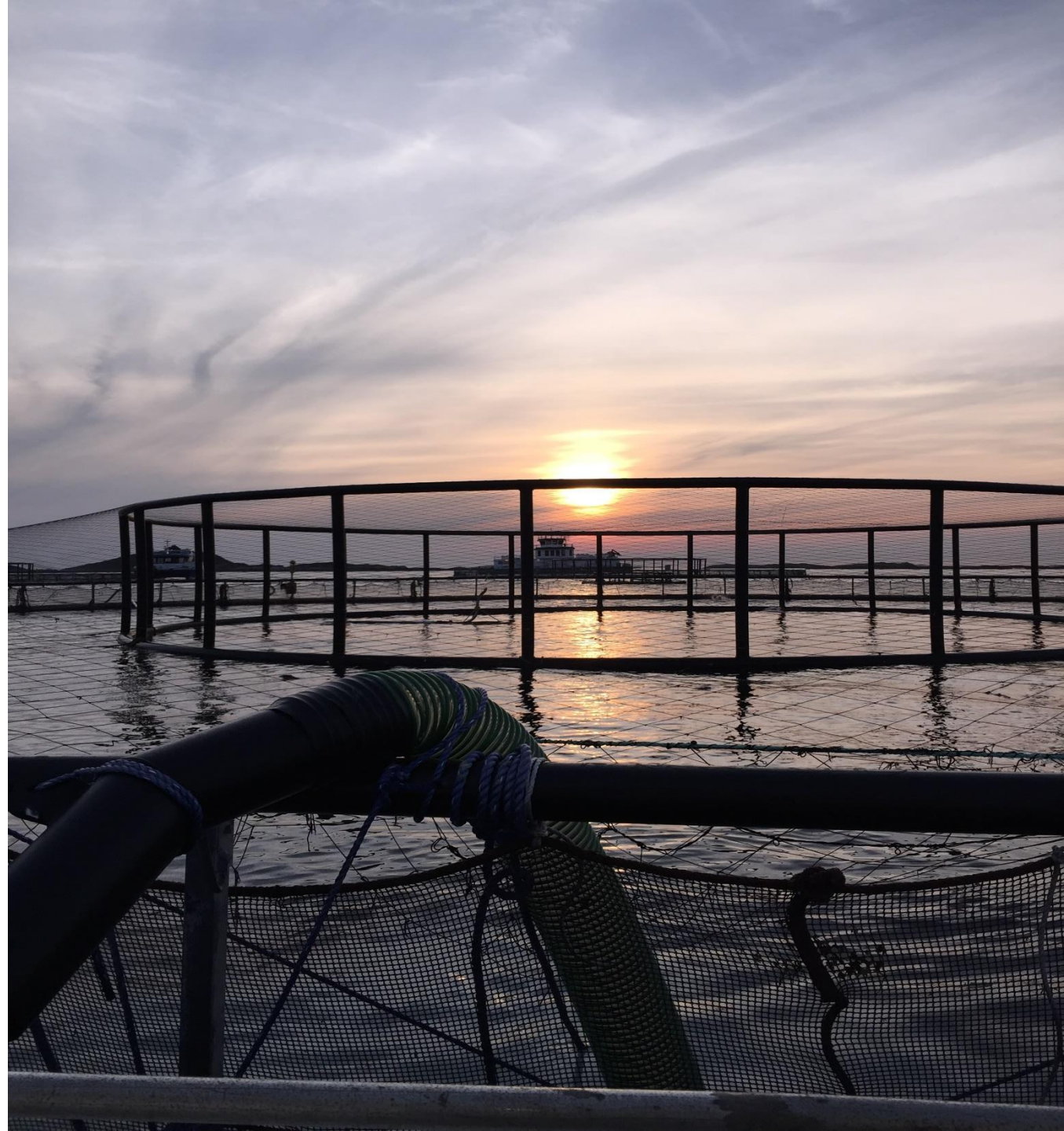


...sometimes (believe it or not!) it's like this:



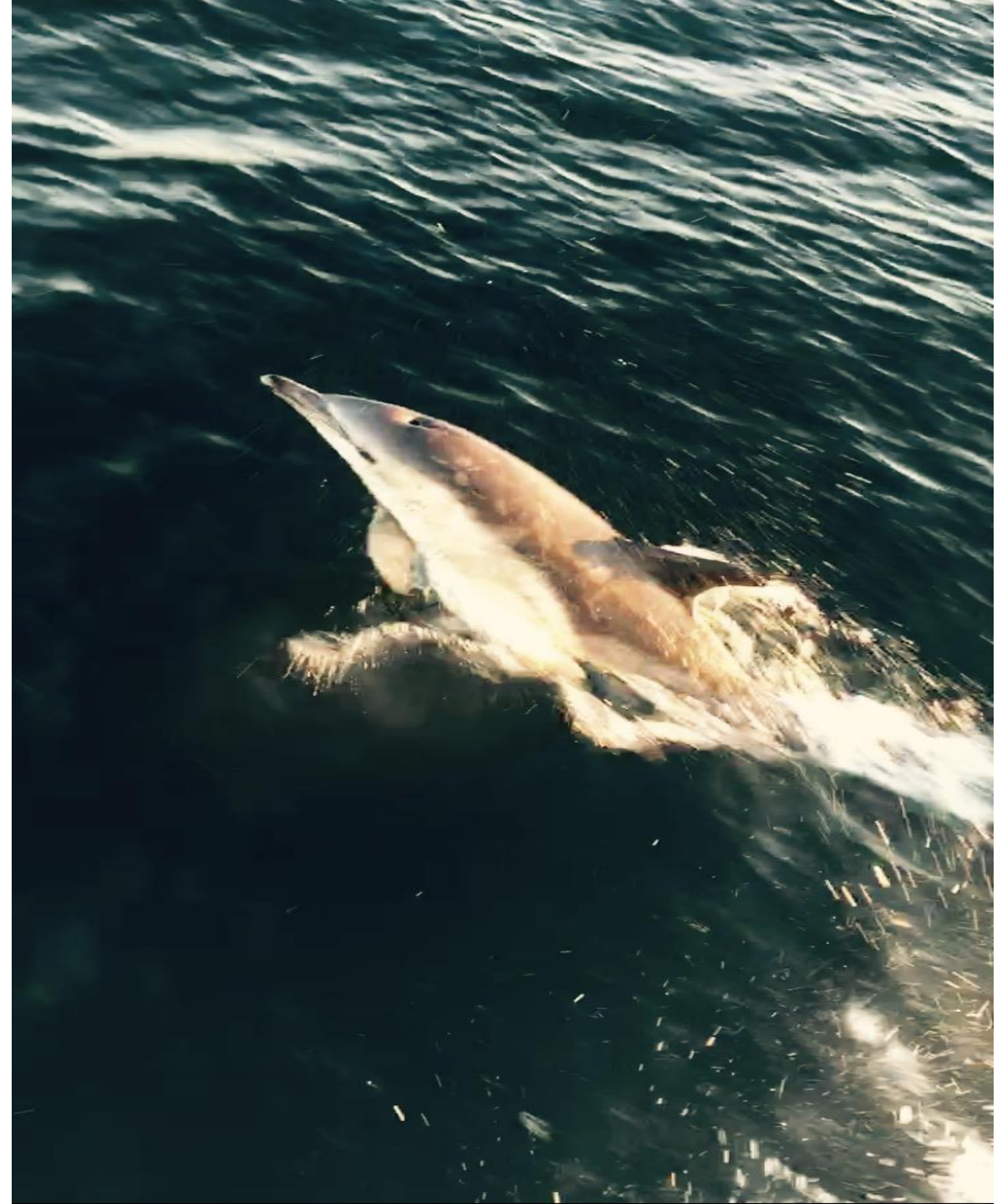
• What determines salmon behavior?

- Temperature
- Light
- Water current
- Oxygen



Why modify the current?

- **Some parts of the year, the oxygen saturation might be low**
 - Occures naturally
 - An disadvantage to our production
- **Where is the oxygen saturation low?**
 - At our locations, most frequently in the upper 10 meters
- **Temperature layers**
 - Oxygen saturation might vary due to water layers with different temperatures
 - In the winter it might be a benefit to elevate the temperature



Normal behaviour:

AKVAconnect - Lisensiert til Midtnorsk Havbruk Rørvik -

Kamerabilde 4 (primær)

undervann - Skrosen M 01

D: 15 T:10.8 U:12.7 H:348

An underwater camera view showing a large, dense school of fish, likely Atlantic salmon, swimming in a tank. The fish are silvery and appear to be moving in a coordinated pattern. The water is slightly turbid, and the lighting is somewhat dim, typical of an underwater environment.

undervann - Skrosen M 02

D: 18 T:10.9 U:12.3 H:284

An underwater camera view showing a large, dense school of fish, likely Atlantic salmon, swimming in a tank. The fish are silvery and appear to be moving in a coordinated pattern. The water is slightly turbid, and the lighting is somewhat dim, typical of an underwater environment.

AKVAGROUP





Start changing behaviour
after a week:

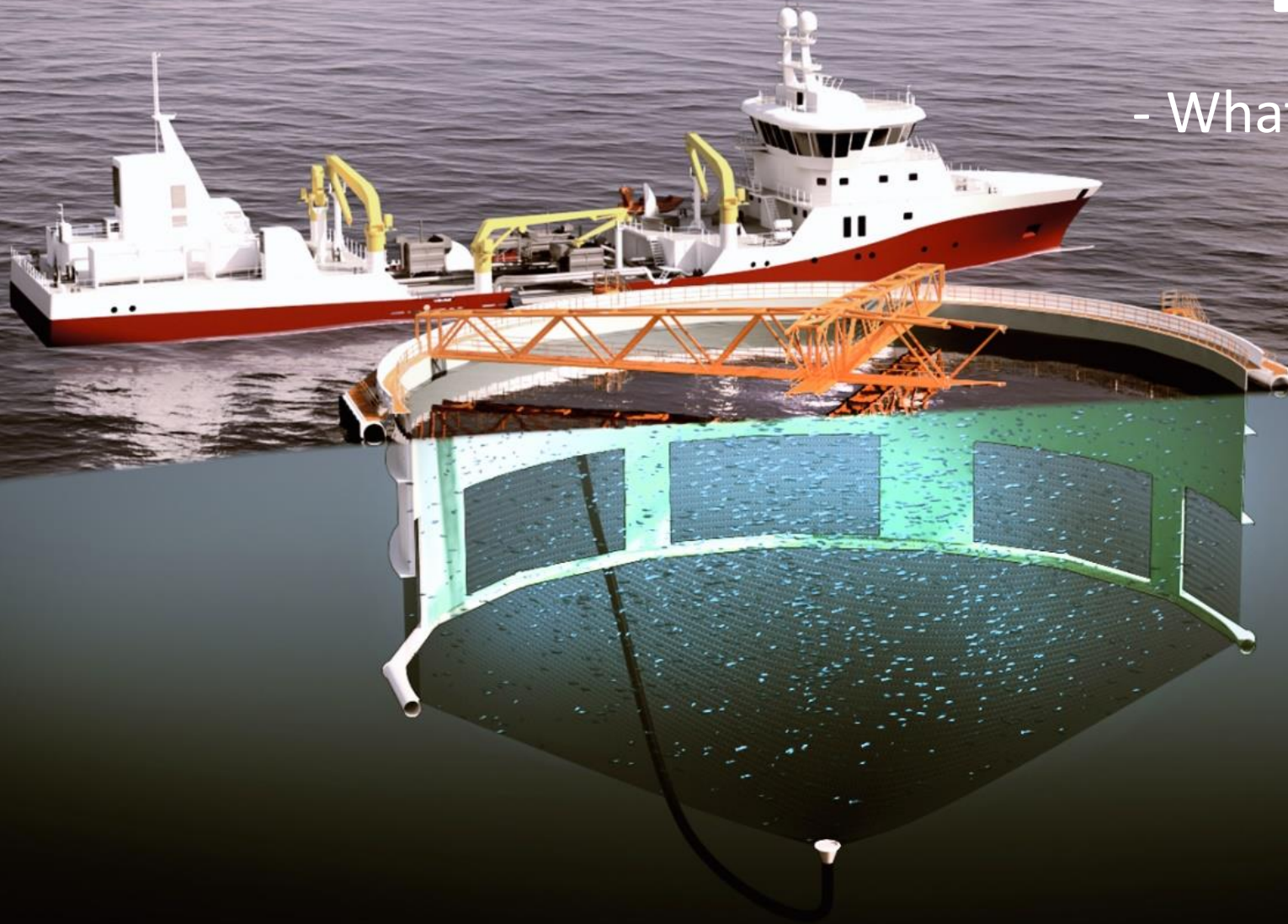


After a few more weeks:



Aquatraz

- What's in it for a salmon?



Water current improve cardiac health

STAR-CCM+



9,4902e-05

0,60295

1,2058

Velocity (m/s)

1,8087

2,4115

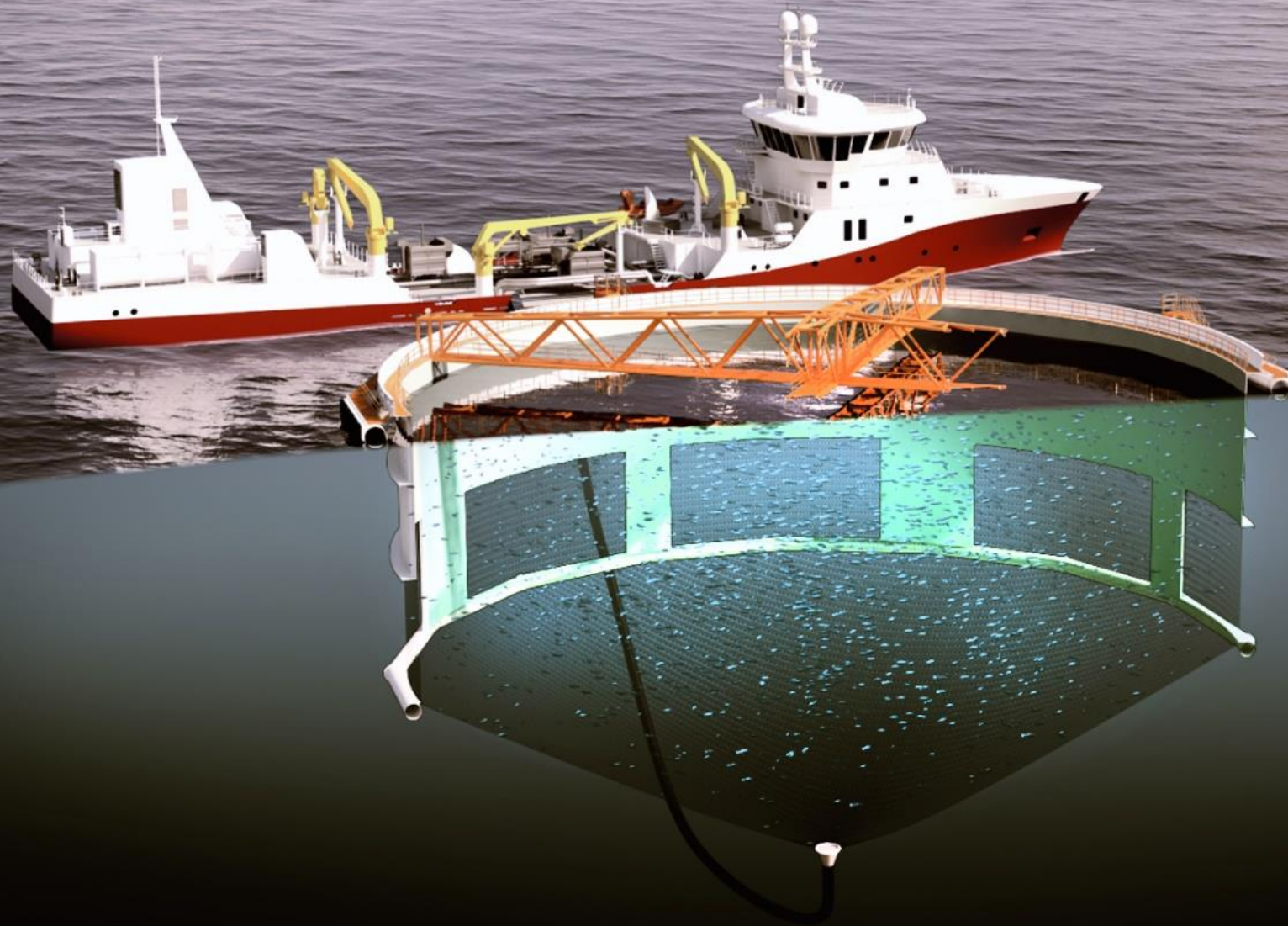
3,0144



Lice/ temperature/ oxygen/ algae/ gill health



Crowding

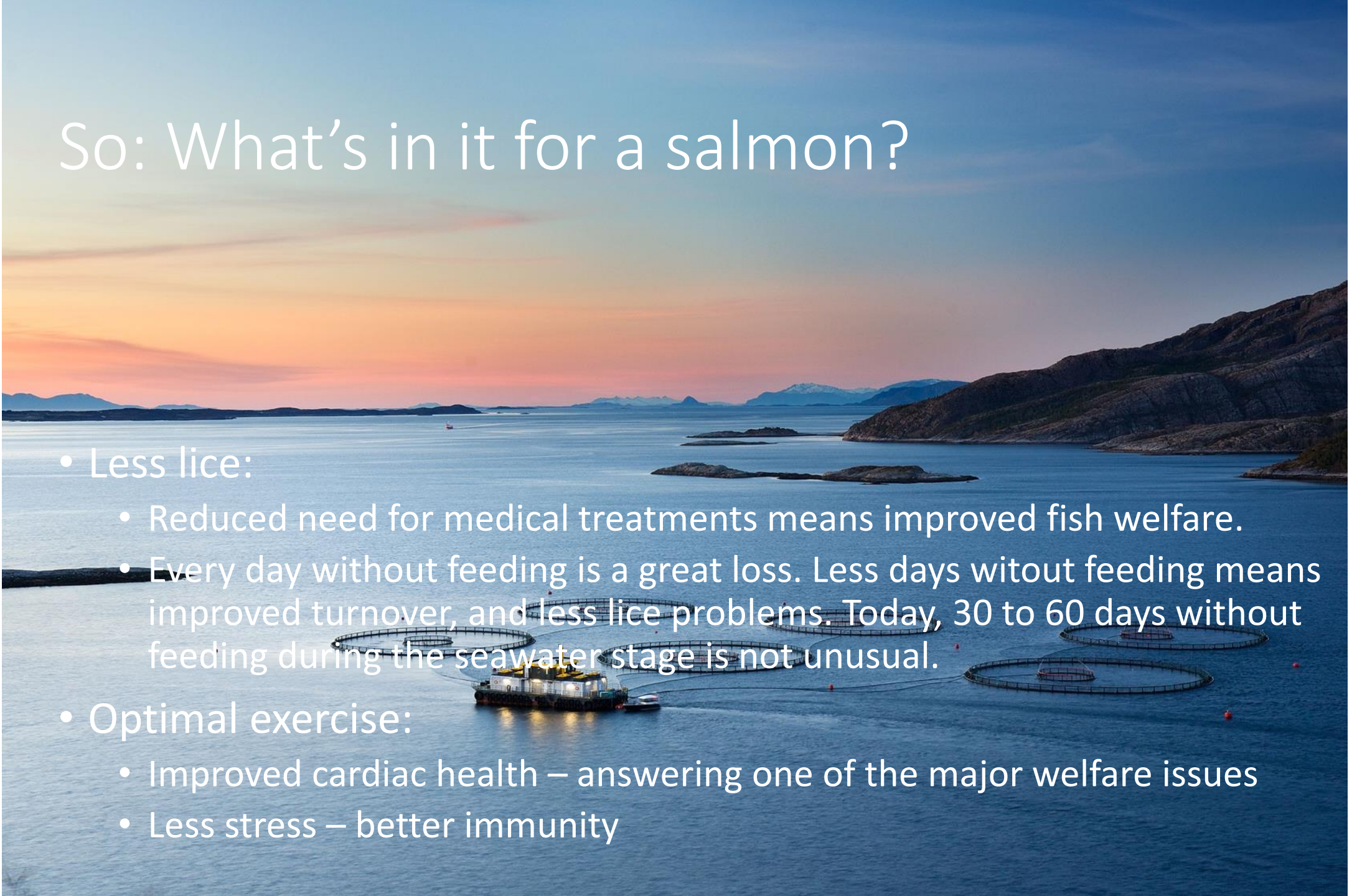


Crowding, final stage



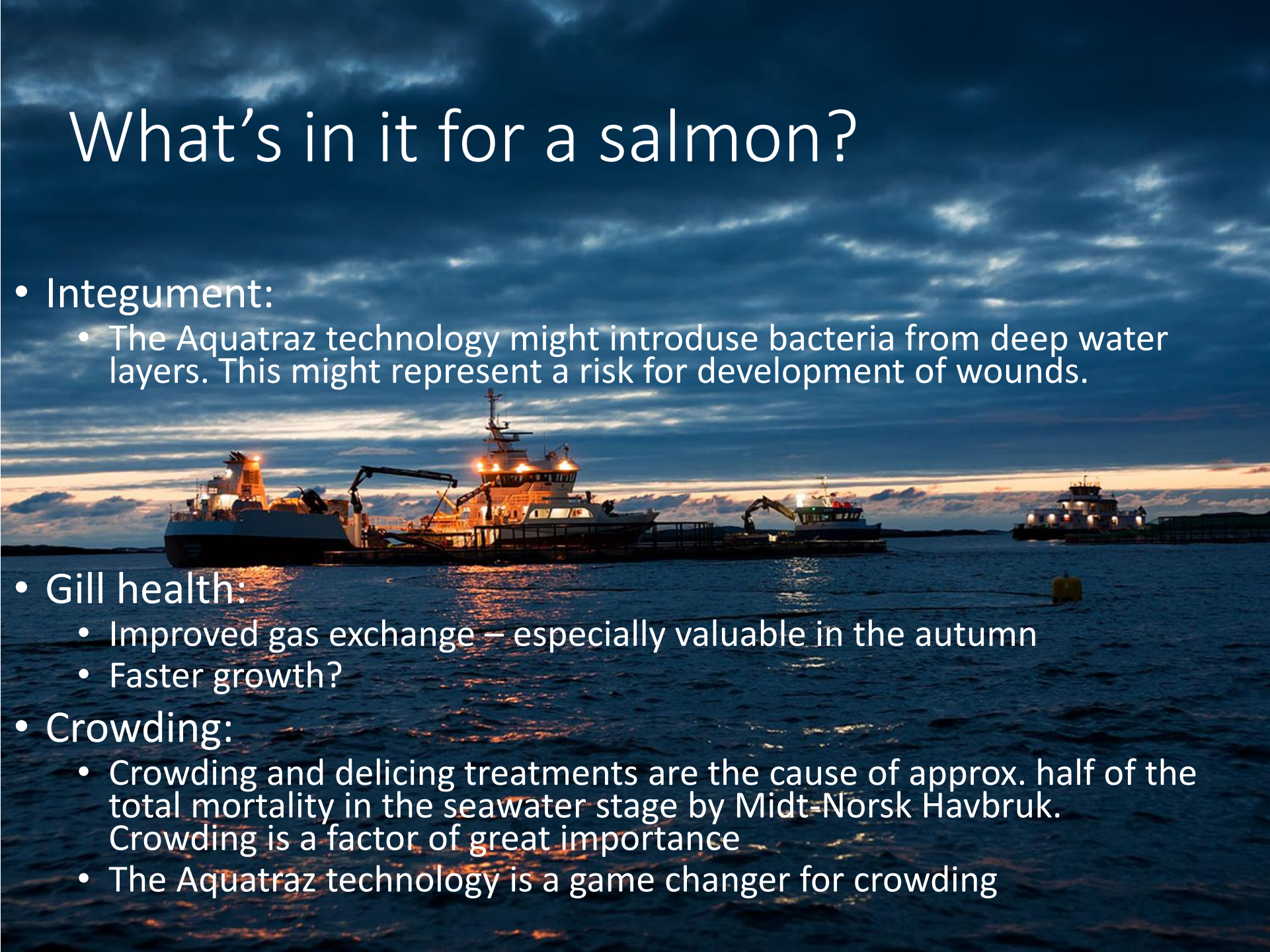
So: What's in it for a salmon?

- Less lice:
 - Reduced need for medical treatments means improved fish welfare.
 - Every day without feeding is a great loss. Less days without feeding means improved turnover, and less lice problems. Today, 30 to 60 days without feeding during the seawater stage is not unusual.
- Optimal exercise:
 - Improved cardiac health – answering one of the major welfare issues
 - Less stress – better immunity



What's in it for a salmon?

- Integument:
 - The Aquatrax technology might introduce bacteria from deep water layers. This might represent a risk for development of wounds.
- Gill health:
 - Improved gas exchange – especially valuable in the autumn
 - Faster growth?
- Crowding:
 - Crowding and delicing treatments are the cause of approx. half of the total mortality in the seawater stage by Midt-Norsk Havbruk. Crowding is a factor of great importance
 - The Aquatrax technology is a game changer for crowding



Further information:



- www.seafarmingsystems.com
- www.mnh.no (Only Norwegian language)
- mailto: torolf@mnh.no