Presentation of the NordicRAS network and its activities

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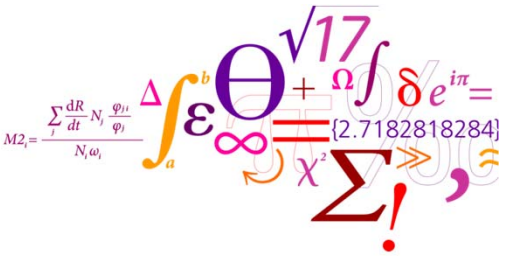


DTU Aqua
National Institute of Aquatic Resources

NordicRAS norden

Why and Who are we?

- Why?
  DTU Aqua initiative
  Speed up stagnant aquaculture industry


Model trout farms


Langsand Laks


Danish Salmon

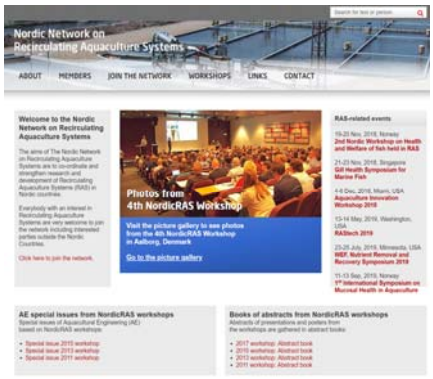
- Founded 2011 with NCM support
- Steering committee: Denmark, Norway, Sweden, Finland, Iceland

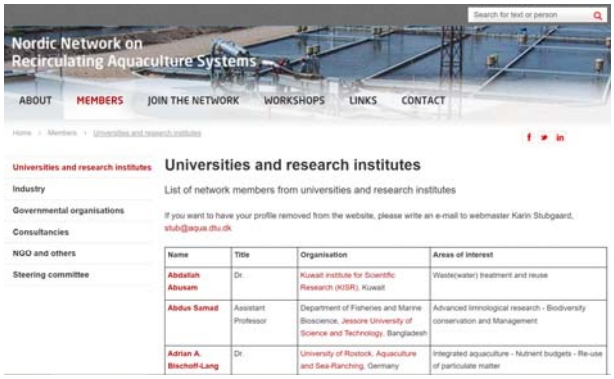
Ongoing activities

- Norwegian smolt & post-smolt
- RAS2020 (Nordic Aquafarms)
  - Kingfish (Sashimi royal)
  - Salmon (Fredrikstad seafoods)
- Atlantic Sapphire, Miami, USA
  (Aim: 90 000 t/yr)
- Nordic Aquafarms, Maine, USA
  (Aim: 40 000 t/yr)
- …

Main activities

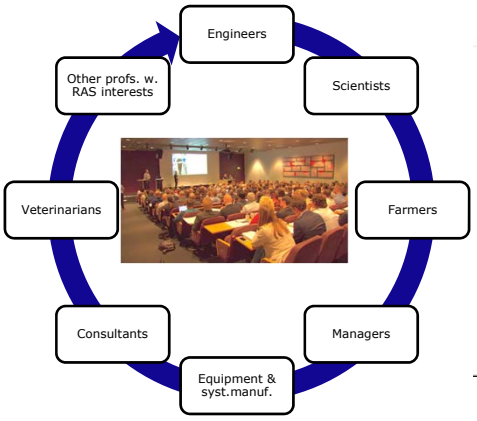
Website: www.NordicRAS.net

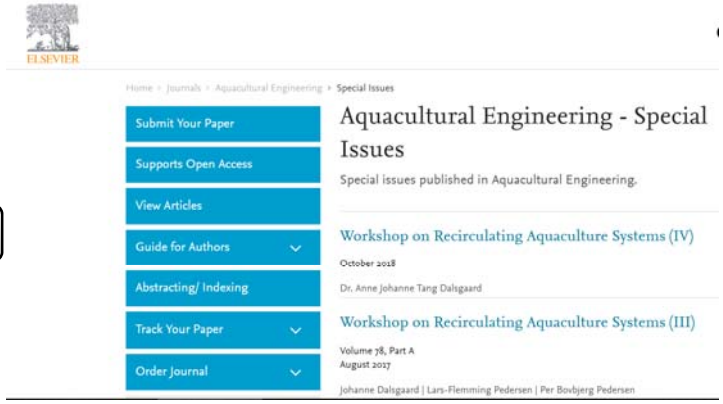




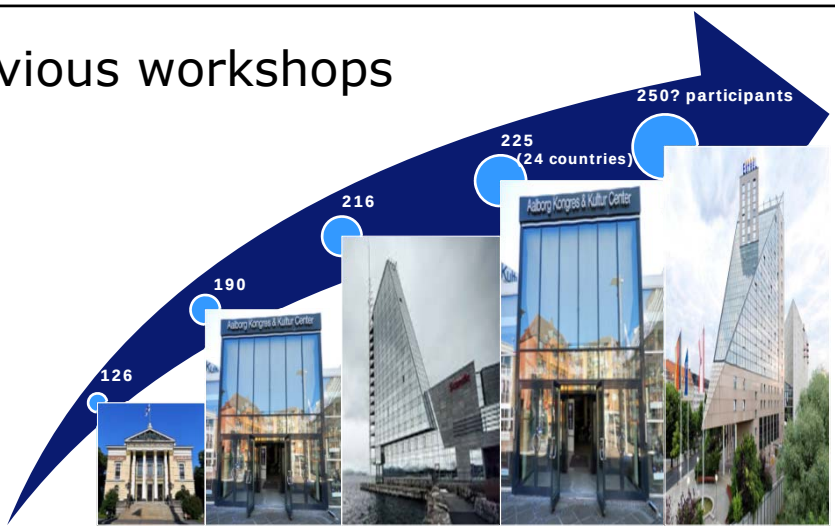
Main activities

Biennial workshop





Previous workshops



1st	2nd	3rd	4th	5th
2011	2013	2015	2017	2019
Helsinki Finland	Ålborg Denmark	Molde Norway	Ålborg Denmark	Berlin Germany
			AES session	Back-to-back Aquacult. Europe 2019

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Previous workshop topics

RAS in practice	End-of-Pipe treatment	Feed and waste charac.	
On-growing of different species	Saltwater RAS	Gases & degassing	Common field of interests
WQ in RAS	Complete system approaches	Harmful substances	
Microbiology & biofiltration	Online monitoring	Therapeutants	
Waste management	Energy optimization	Diseases in RAS	
		Particles & microbial WQ	

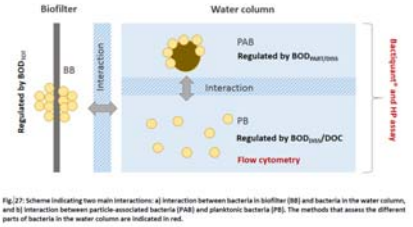
Particles and microbial WQ

Particle origin in RAS: - Faeces
- Feed spill
- Dust

Particle effects in RAS: - Loading on treatment units
- Stress on biofilter (elevated NH_4^+, NO_2^-)
- Stress on fish: - Directly?
  - Indirectly?

Particulate & dissolved organic matter: feed for heterotrops:

- Surface attached
- Attached to particles
- Free swimming



Rojas-Tirado, PA 2018, Microbial water quality within Recirculating Aquaculture Systems. PhD. DTU Aqua. Technical University of Denmark

- Heterotrops most abundant in RAS
- High growth rate
- Neutral / beneficial
- Opportunistic bac., potential pathogens

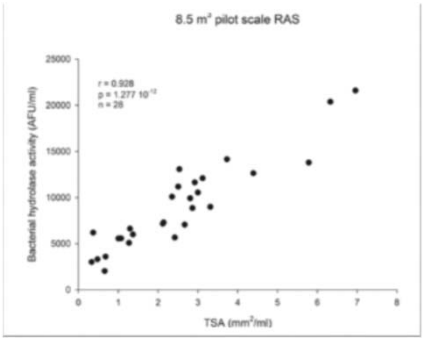
Particle size and surface area

Higher recirc. intensity → smaller particles increasingly difficult to remove

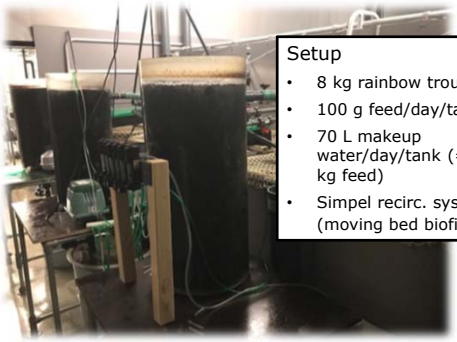
Smaller particles → more surface area

Relationship between particle size and specific surface area
(www.shimadzu.com/an/powder/sald/data/appli/app3.html)

More surface area → more bacteria activity

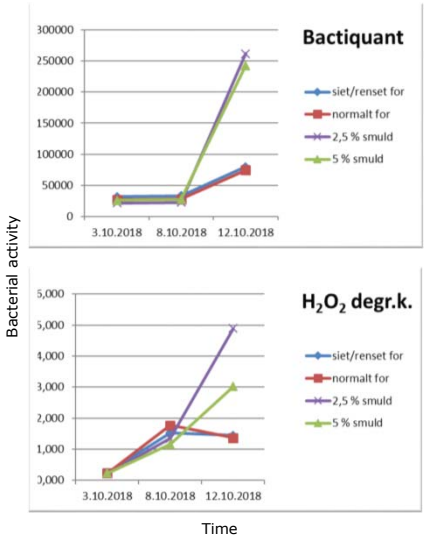


Prelimiary feed dust trial



Setup
- 8 kg rainbow trout/tank
- 100 g feed/day/tank
- 70 L makeup water/day/tank (=700 L pr kg feed)
- Simpel recirc. system (moving bed biofilter)

Treatments:
- 1 tank feed directly from bag
- 1 tank sieved feed
- 1 tank 25 g dust/kg feed
- 1 tank 50 g dust/kg feed



Coming focus areas & potential collaboration as we see it

- Cannot discuss technology without discussing diseases and *vice versa*
- What makes fish susceptible to diseases?
- Interactions bewteen diseases – RAS environment - management
- Therapeutants and water disinfection
- None of these issues can be solved by technicians or veterinarians by themselves but require collaboration
- **5th NordicRAS workshop, 7-8 Oct. 2019, Berlin, back to back with Aquaculture Europe 2019 (8-10 Oct. 2019) (www.NordicRAS.net)**