Setting the stage: what is precision aquaculture?

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Application of Sensors in Precision Aquaculture

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Aquaculture

The farming of aquatic organisms

Fish

Molluscs

Crustaceans

Aquatic Plants

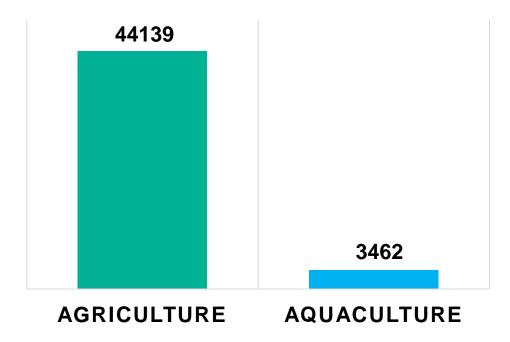
Amphibians ...

Precision aquaculture

The acquisition and interpretation of data about the aquatic environment and farmed species through sensors that can provide decision support for farm operations.



Precision farming is not a new concept



Number of Review articles, Research articles and Book chapters retrieved from Science Direct search 2015-2021





Challenges

Harsh environment

Access can be impeded by weather

Power and connectivity

Large range of spatial scales



Precision Aquaculture

The motivation...

Farms are getting bigger and moving offshore

and moving offshore

Pressure from consumers and regulators



New real-time sensor technologies



Precision aquaculture: the framework

DATA COLLECTION & INTEGRATION

Aquatic Environment

- Temperature
- Nutrients
- pH
- Salinity
- Pollutants

Species related data

- Biomass
- Behaviour
- Physiology

Existing data

- Weather
- Hydrography

DATA ANALYSES

Modelling and Insight

- Image analyses
- Species growth
- Forecasts

SUPPORT DECISION

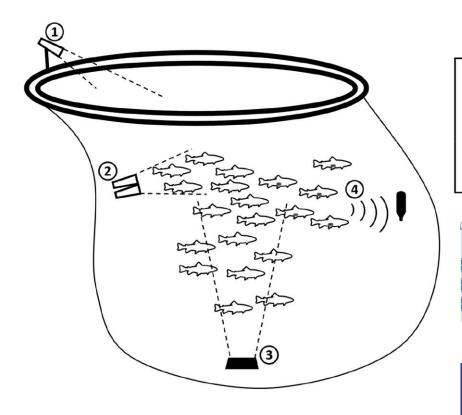
- Feed management
- Harvesting schedule
- Veterinary intervention
- Early warning
- Risk analysis

Observe Interpret

Decide and act

Precision Aquaculture

What does it look like?



- 1 Surface camera
- ② Stereo video
- ③ Sonar
- 4 Acoustic telemetry



- 5 Water quality probes
- 6 Local weather station
- 7 Satellite-based monitoring

Real Time Monitoring

Føre et al. 2018

Biosystems Engineering Volume 173, September 2018, Pages 176-193

Precision aquaculture: moving forward

Sensors need to be:

robust

low-cost

capable of underwater and in-air wireless connectivity

high level of Interoperability

Data Management

Models need to be robust

Security and sovereignty of data is critical to exploit technology in an ethical and commercially sustainable way.

Thank you

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