

SINTEF

IFISH 5
International Fishing Industry Safety & Health Conference
St. John's, NL, Canada | June 10 -13, 2018

POST-CONFERENCE WORKSHOP June 13, 2018

"Global Aquaculture Occupational Health and Safety: National and International Perspectives"

# OHS IN NORWEGIAN AQUACULTURE

Ingunn Marie Holmen and Trine Thorvaldsen
SINTEF Ocean, Trondheim, Norway

SINTEF

2017:00822 - Unrestricted

# Report

## Occupational health and safety in Norwegian aquaculture

National profile for a FAO report on global aquaculture OHS

Author(s)
Ingunn Marie Holmen
Trine Thorvaldsen



SINTEF Ocean AS

2018-05-23

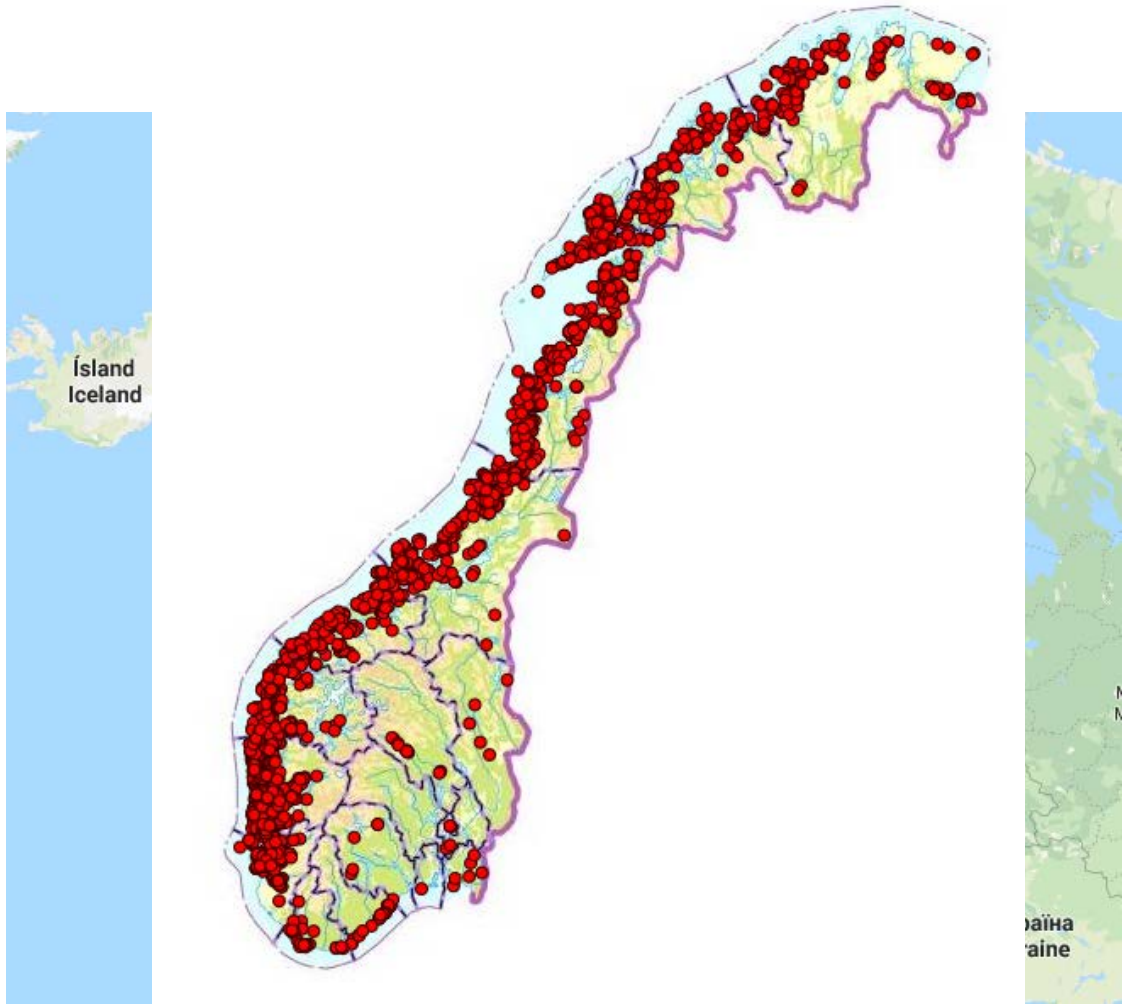


SINTEF

# Norwegian aquaculture industrv

## Source: Directorate of Fisheries (2016)

- Total production: 1.33 mill metric tons
- Sales value: 64 billions NOK
- No of licences:
  - Salmon and trout: 990 grow-out/total 1342
  - Other marine species: 284
  - Molluscs etc: 198
  - Sea-ranching: 12
  - Algae: 242
- Registered 7825 employees
- Fish farming (salmon, trout) is 99.6 % of total biomass production




SINTEF

# Key numbers of the Norwegian fish farming industry (2016)

- 160 finfish farming companies
  - 990 sites (salmon or trout) in sea water
- Approx. 6400 employees
- The industry needs larger productions areas to grow
- Expanding to new locations further from shore
  - Exposed working conditions
  - Higher demand on the operator
  - Need to adjust requirements on overall design, operations and risk management



Picture: Sensodrone Project: Maritime Robotics / SINTEF FH / ACE

SINTEF

# Today's fish farms already operate at the safety limit for available technology, fish welfare and personnel

- Structural breakdowns
- Fish escapes
- Parasites and infections
- Reduced availability of farms
- Postponed operations
- The Norwegian aquaculture industry is the 2nd most risk exposed occupation in Norway, according to the rate of occupational injuries and fatalities



SINTEF



Foto: Rostein AS

# Net cage

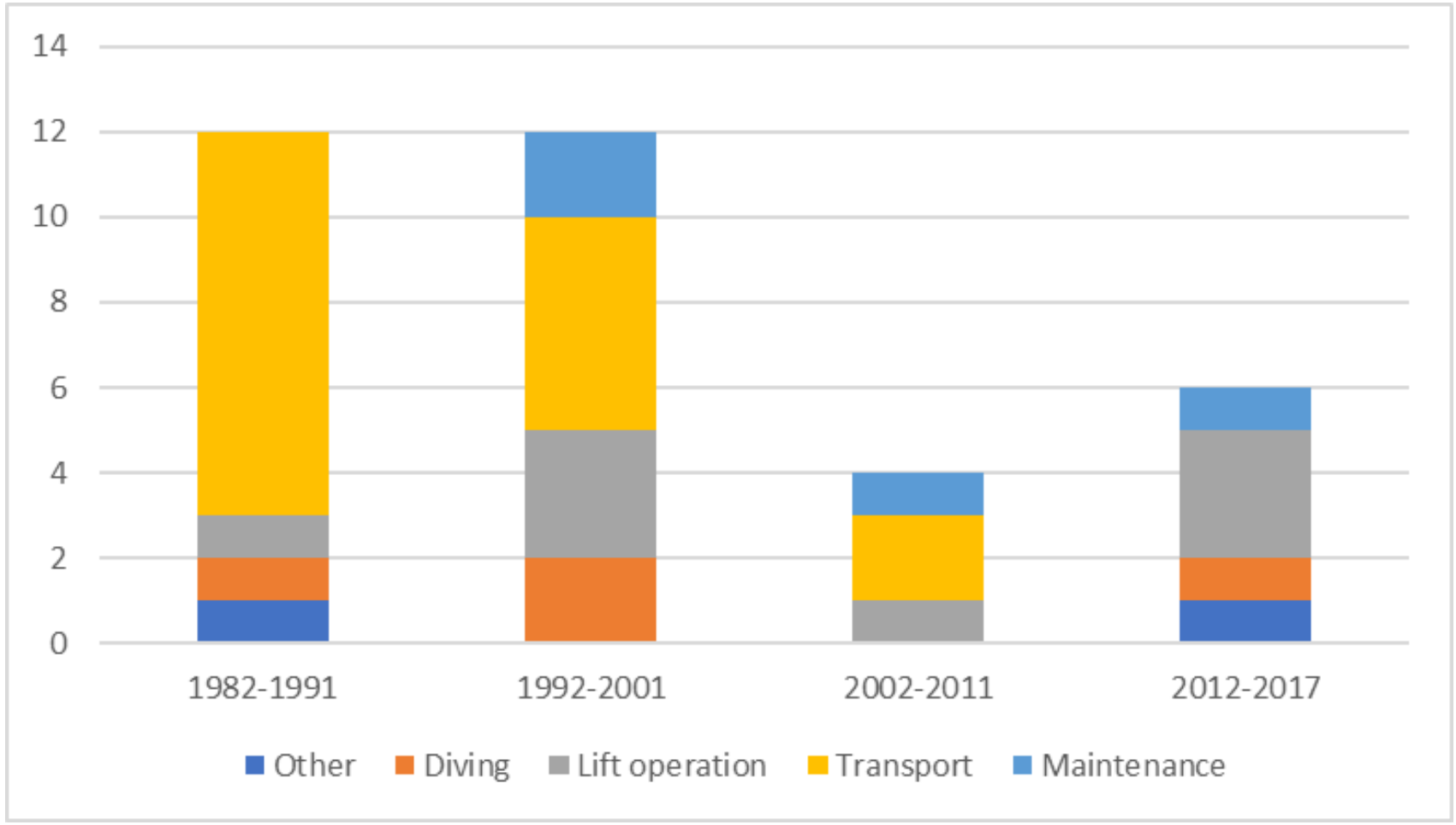
- Frame of ropes
- Netting mounted (laced) to the frame of ropes

- Attached to the floating collar
- System to ensure volume
  - Weights
  - Bottom ring
- Dead fish removal system
  - Pump dead fish





# Occupational fatalities 1982-2017



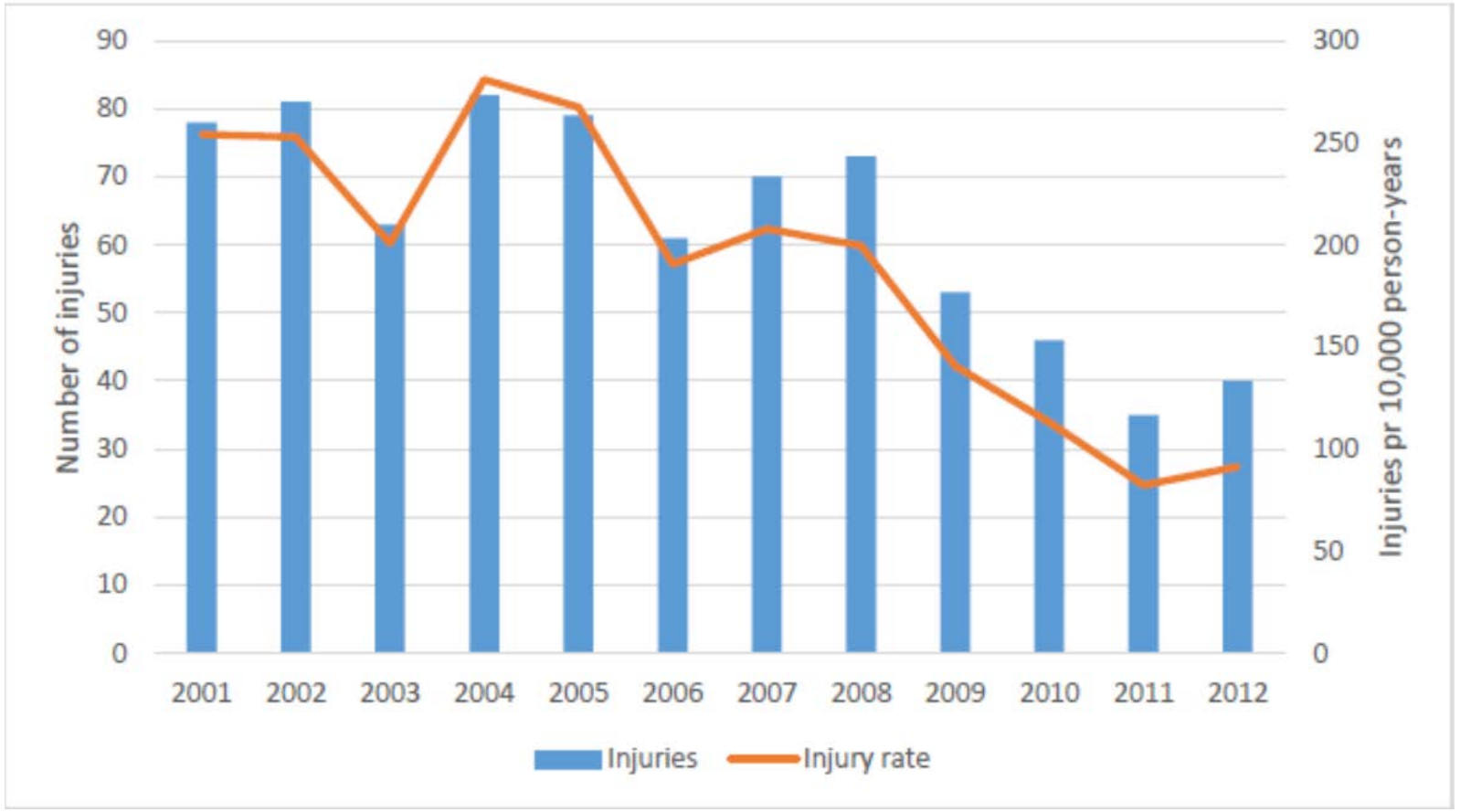



Holen, Utne, Holmen & Aasjord (2018). Occupational safety in aquaculture – Part 2: Fatalities in Norway 1982-2015. Marine Policy 96: 193-199.

SINTEF

# Occupational injuries 2001-2012

## Source: Norwegian Labour and Welfare Administration

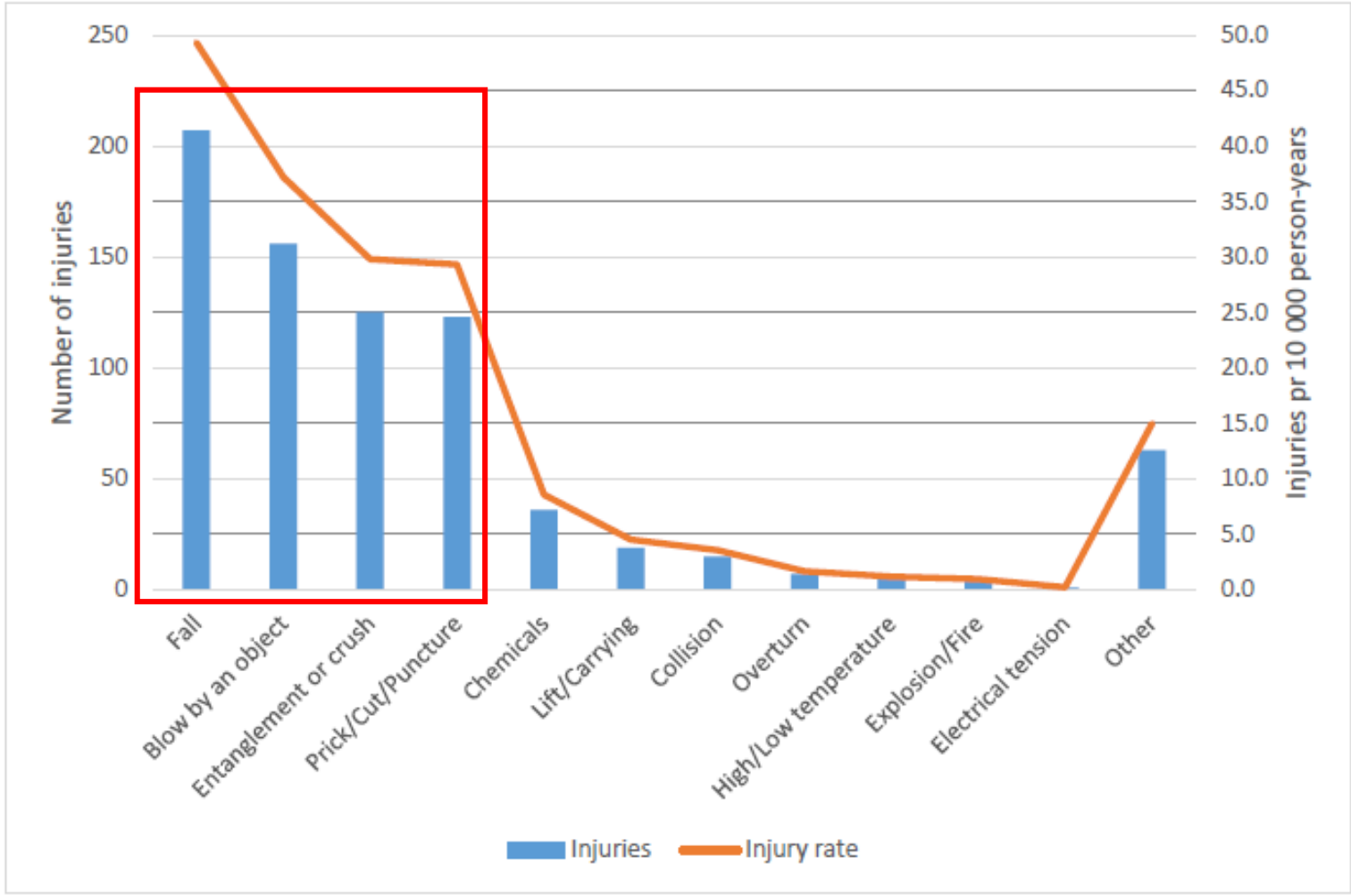





Holen, Utne, Holmen & Aasjord (2018). Occupational safety in aquaculture – Part 1: Injuries in Norway. Marine Policy 96: 184-192.

SINTEF

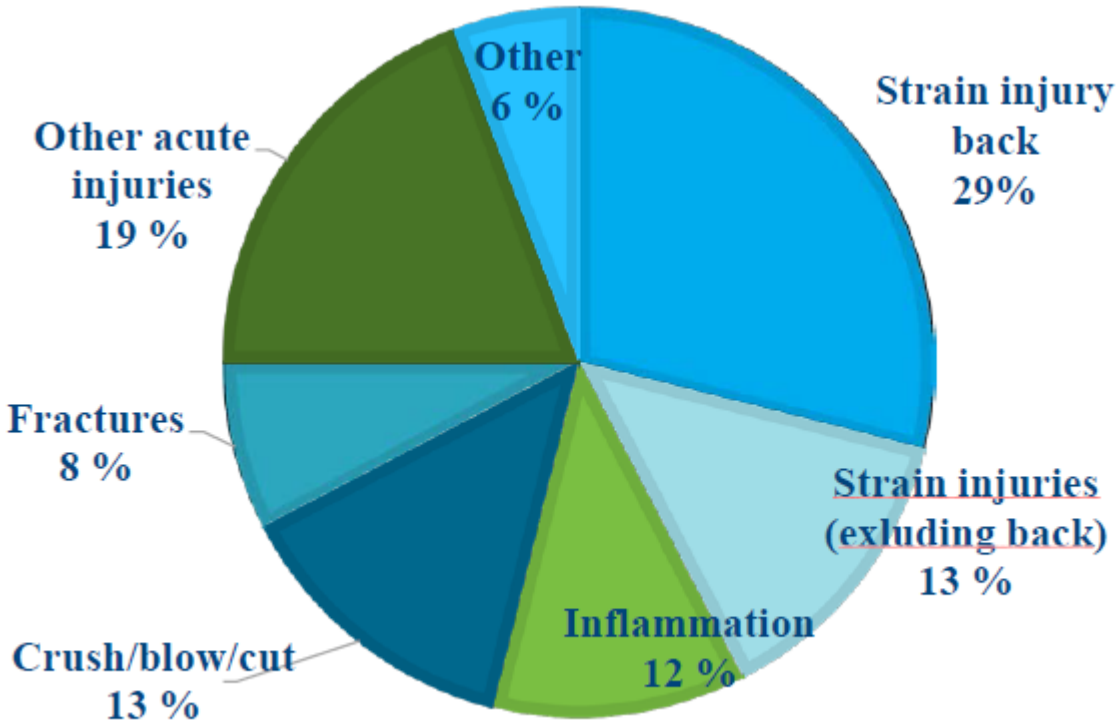
# Occupational injuries – mode of injury (2001-2012)




Holen, S., Utne, I.B., Holmen, I.M. & Aasjord, H. (2017) Occupational safety in aquaculture – Part 1: Injuries in Norway. Marine Policy 96: 184-192.

SINTEF

# HSE survey – work-related sickness absence




12.5% (52 of 447 respondents)

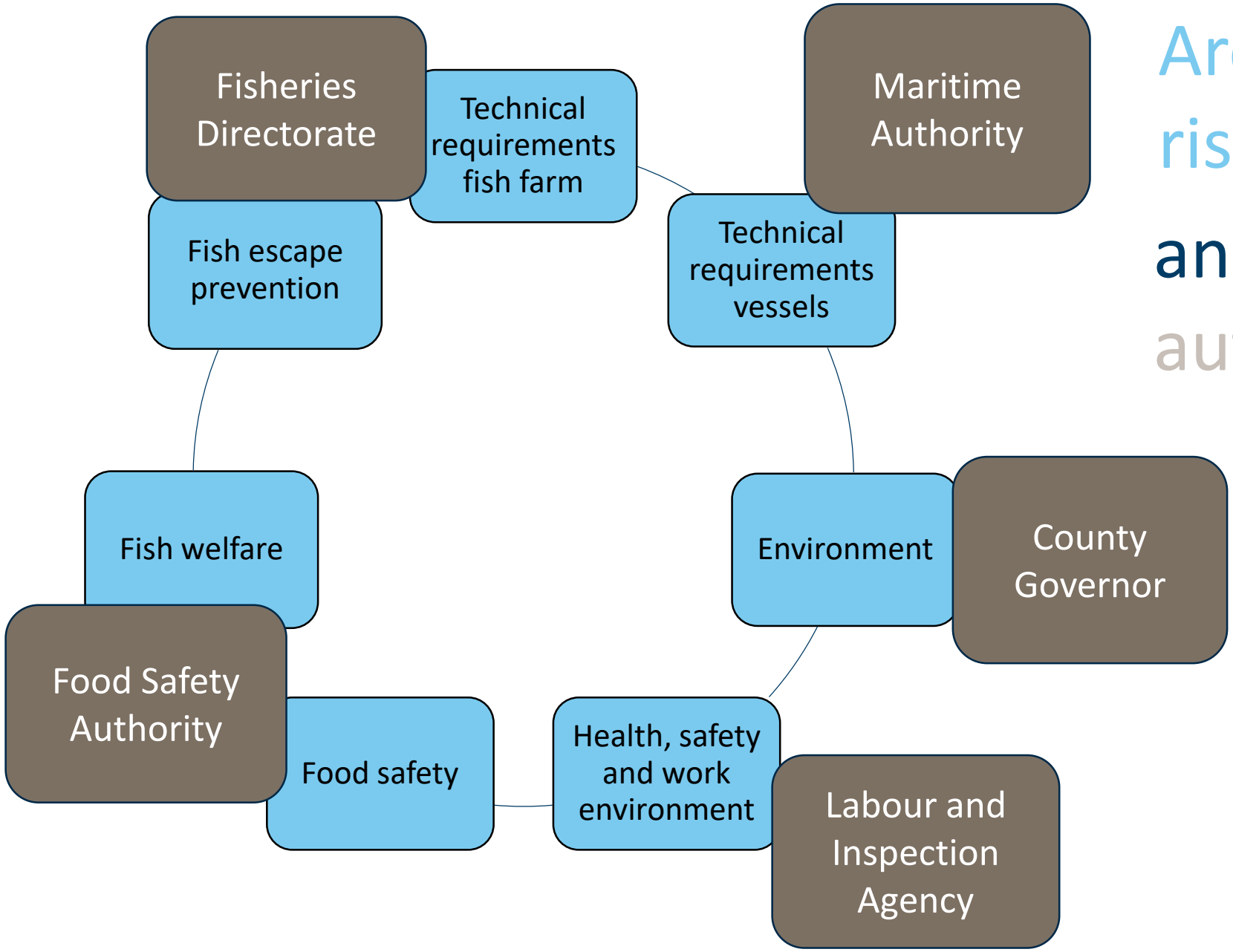


Thorvaldsen T, Holmen IM, Kongsvik T (2017). Self-reported status of health, safety and work environment in the Norwegian fish farming industry – a survey in year 2016. (In Norwegian). SINTEF report OC2017 A-113. ISBN 978-82-7174-289-8.

SINTEF

# Work-related OHS factors

- Exposure to strong wind
- Exposure to noise
- Work in cold environment/feel cold
- Lifting with upper body twisted or bent
- Work with hands above shoulder height
- Heavy lifting
- Repetitive and monotonous work operations
- Exposure to chemicals
- Work stress
- Lack of involvement
- Insufficient time for rest
- The organization of work is demanding/straining




# Areas for mandatory risk management and the regulatory authorities

SINTEF

# OHS regulations in Norway

- The Norwegian Model – statutory tripartite cooperation
- The Working Environment Act
- Organisation of work and working hours
- Safety representatives and safety committee at the workplace
- Mandatory Occupational Health Services
- Safety management
  - Internal Control regulation

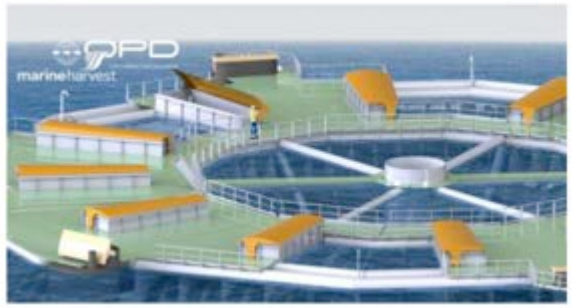



**The steps of the Internal Control mandatory for the Norwegian aquaculture industry, adapted from (Norwegian Labour Inspection Authority (NLIA), 2017).**

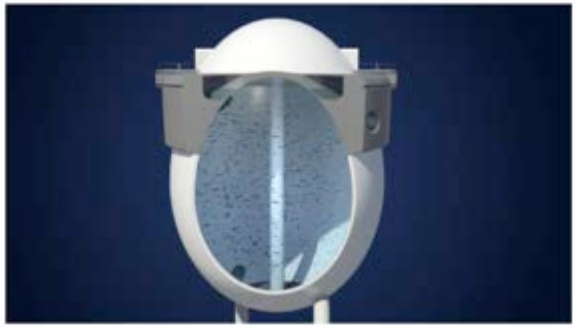


SINTEF

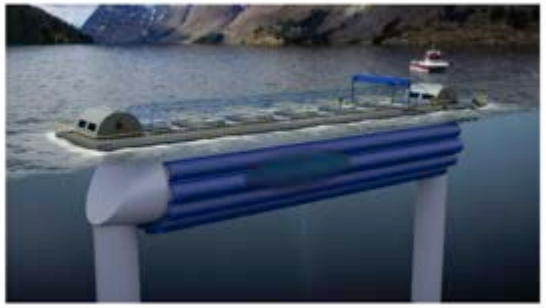
# Future fish farm technology concepts




Marine Donut



The Egg



Pipefarm



Havfarm



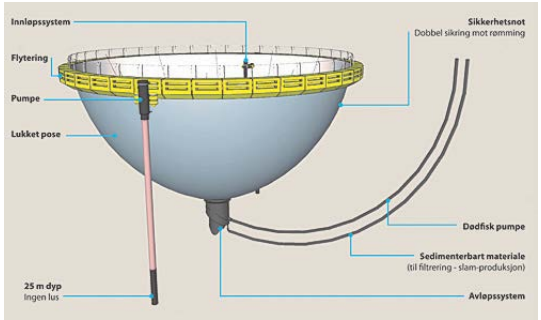
Ocean Farm 1



Atlantic subsea farming



Aquatraz

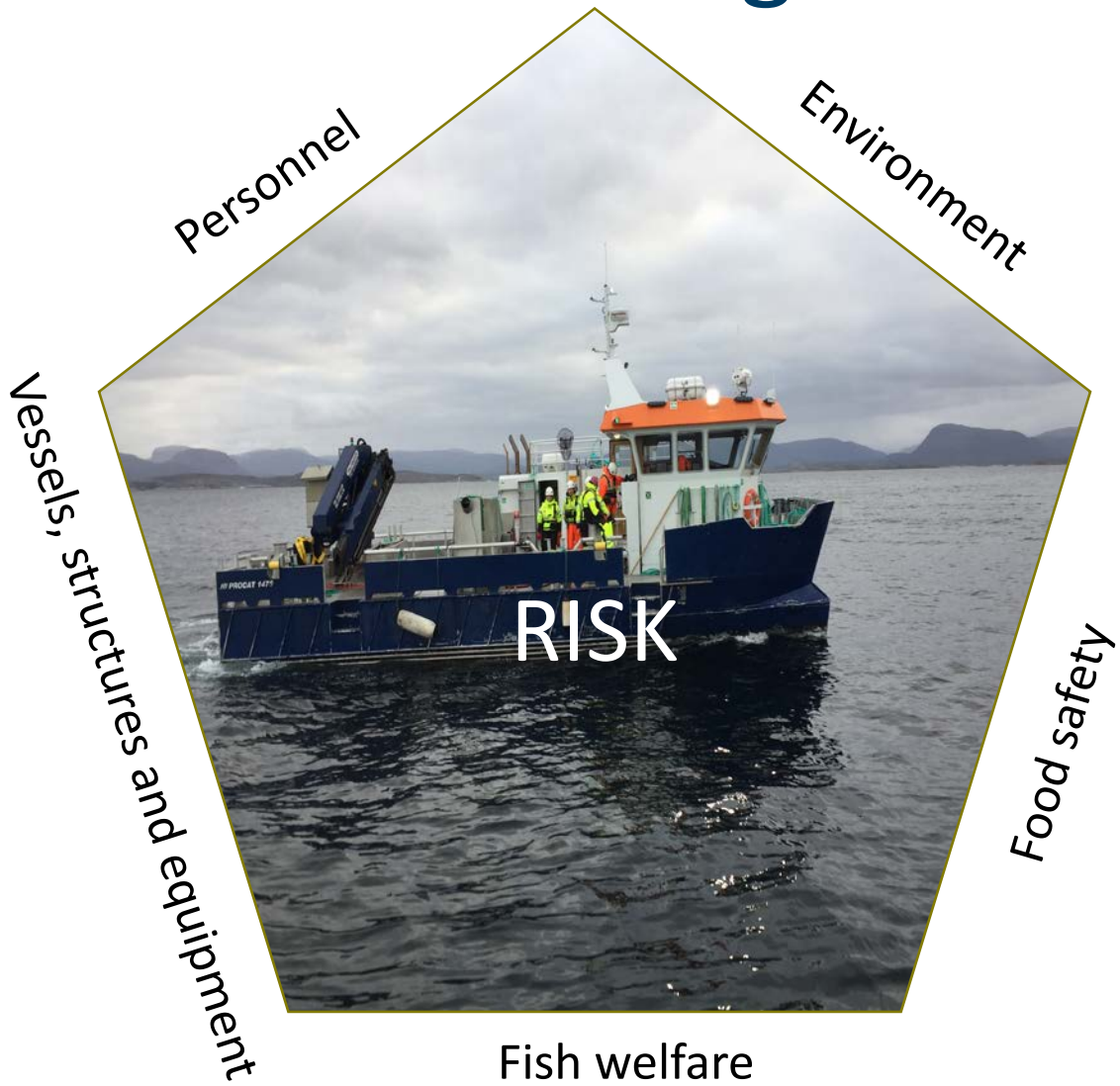



AkvaDesign



SINTEF

# Risk model for fish farming




Yang, Utne & Holmen (submitted)

Project:
Reducing risk in aquaculture
Improving operational efficiency, safety and sustainability

Researcher project funded by the Norwegian Research Council

SINTEF

SINTEF

Technology for a better society