

Updated figures and tables for paper “Technological innovations promoting sustainable salmon (*Salmo salar*) aquaculture in Norway”

The original analysis as presented in the published paper (Moe Føre et al., 2022) provides the status per 13th of September 2021. Here, updated figures and tables with the status per 26th of October 2023 is provided. During this two-year period, one additional application was awarded, and one concept were awarded additional licenses after complaints. Further, one concept will be given a new assessment by the NDF and ten have received final rejections after complaints.

Heidi Moe Føre and Trine Thorvaldsen, 21.12.2023

Reference:

Moe Føre, H., Thorvaldsen, T., Osmundsen, T.C., Asche, F., Tveterås, R., Fagertun, J.T., Bjelland, H.V., 2022. Technological innovations promoting sustainable salmon (*Salmo Salar*) aquaculture in Norway. *Aquaculture reports* 24, 101115, <https://doi.org/10.1016/j.aqrep.2022.101115>.

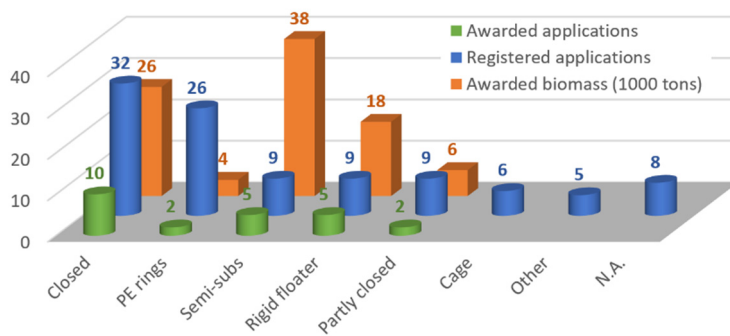


Fig. 2. Number of registered (blue) and awarded (green) fish farm concepts, as well as the biomass associated with awarded development licenses (orange).

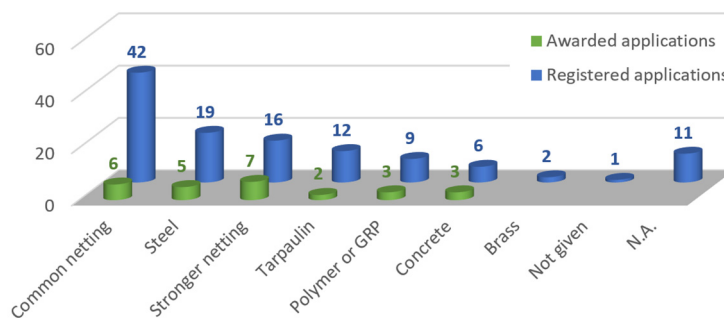


Fig. 4. Enclosure materials.

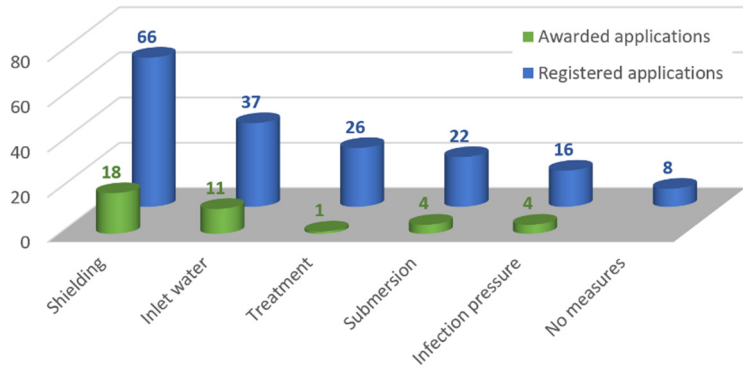


Fig. 5. Measures against sea lice, given as number of concepts including or describing the individual measures.

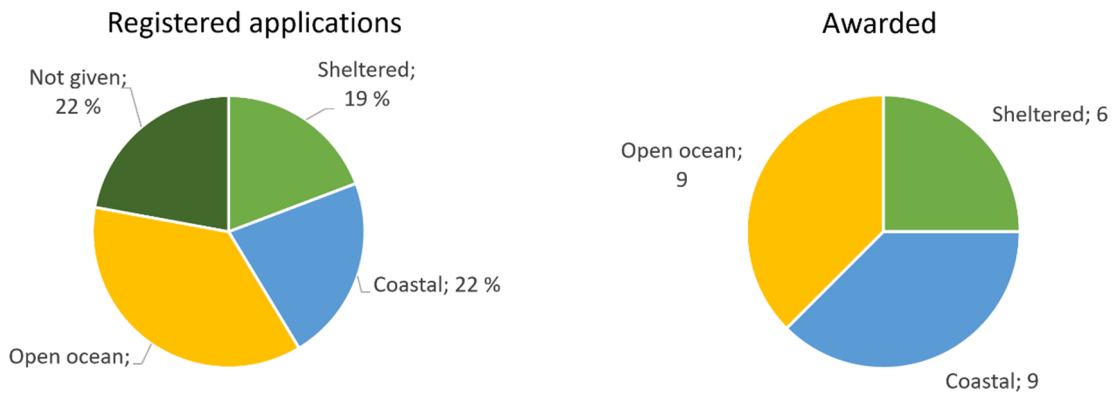


Fig. 6. Area for fish farming (location), given in registered applications as a percent share of total applications (left) and number of applications awarded (right).

Table 1: Registered and awarded applications and awarded licenses and biomass for various farm concepts.

Farm concept	Registered applications	Awarded applications	Awarded licenses / biomass [1000 kg]	Percentage of awarded biomass
Closed	32	10	37 / 26 379	29%
PE rings	26	2	5 / 3 900	4%
Semi-sub	9	5	49 / 37 970	41%
Rigid floater	9	5	23 / 17 940	19%
Partly closed	9	2	8 / 6 240	7%
Cage	6			
N.A.	8			
Other	5			
Total	104	23	122 / 92 429	100%

Table 2: Enclosure volumes in registered and awarded applications.

	Volume [m ³]	Registered applications	Awarded applications
Small	< 20.000	18	6
Medium	20–60.000	46.5 ¹	10
Large	> 60.000	16.5 ⁶	8
Unknown		15	0
N.A.		8	0

Table 3: Other technological aspects in registered and awarded applications.

	Registered applications	Awarded applications
Feeding technology		
Under water feeding	25	8
Power supply		
Electricity from land network	9	3
Own power production	12	2
Barge		
Integrated in floater/platform	27	11
Innovative barge	10	0

⁶ In two cases, enclosures of different size-categories have been applied (small + medium/large). These have been counted in both categories and weighed as half an application in each.

Table 4: Sustainability measures based on descriptions provided by the applicants, given per cent for the number of main categories and number of applications for sub-categories.

Sustainability measures	Applications	Awarded applications
Prevent sea lice infection	92%	100%
Shielding	66	18
Inlet water	37	11
Treatment	26	1
Submersion	22	4
Infection pressure	16	4
Prevent escape	71%	92%
Stronger enclosures	56	21
Operations	18	6
Structural integrity	17	8
Collect waste	41%	46%
Promote fish welfare	60%	71%
Aquatic environment	38	15
Handling	22	4
Surveillance	21	4