Veterinærinstituttet
Norwegian Veterinary Institute

DEN **BIOLOGISKE KOSTNADEN** AV AVLUSNING

DØDELIGHET etter avlusning

TILVEKST

SLAKTEKVALITET

Estimating cage level mortality distributions following different delousing treatments of Atlantic salmon (*Salmo salar*) in Norway

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3 Department of Production Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, PO Box 369 Sentrum, N-0102 Oslo, Norway

Daglig og akkumulert produksjonsdata på merdnivå

Studie periode 2014-2019

Generasjon 2014-2017

159 anlegg (22%)

PO 3-7

4 644 avlusningsbehandlinger

1 837 fiskegrupper

Foto: MarinHelse

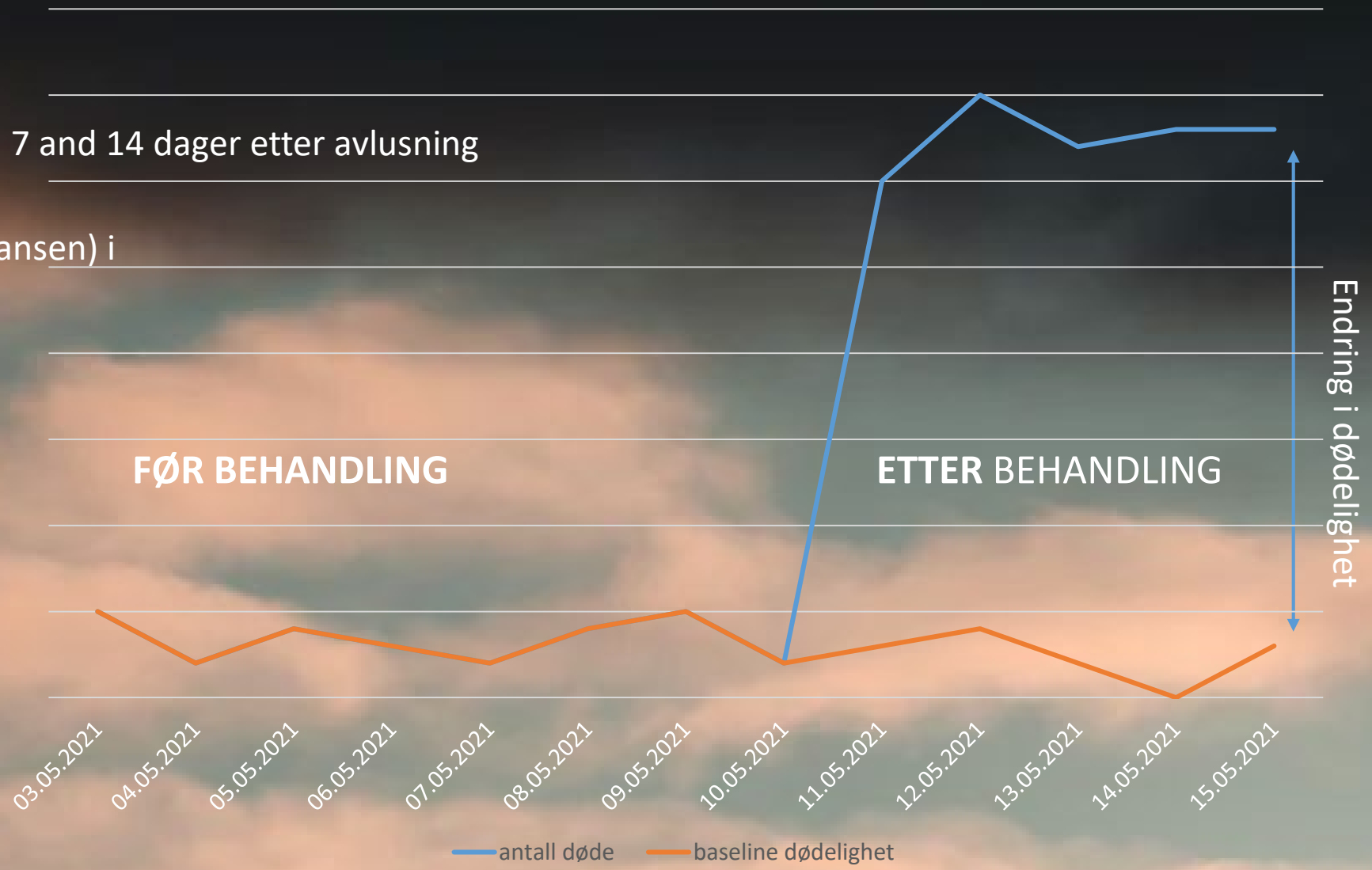
BESKRIVE DØDELIGHET ETTER AVLUSNING

Dødelighetsrate

7 dager før avlusning baseline

Trekker dette fra dødelighet 1, 7 and 14 dager etter avlusning

Distribusjon av endring (differansen) i **dødelighetraten** for alle avlusningsbehandlinger.



Frekvens distribusjon avlusningbehandlinger fra årsklasse 2014 to 2017					
	Årsklasse				
Avlusningskategori	2014	2015	2016	2017	Total
Termisk					
Mekanisk					
Ferskvannsbad					
Hydrogen peroksid					
Medisinsk bad					
Kombinasjonsbehandling					
Total					

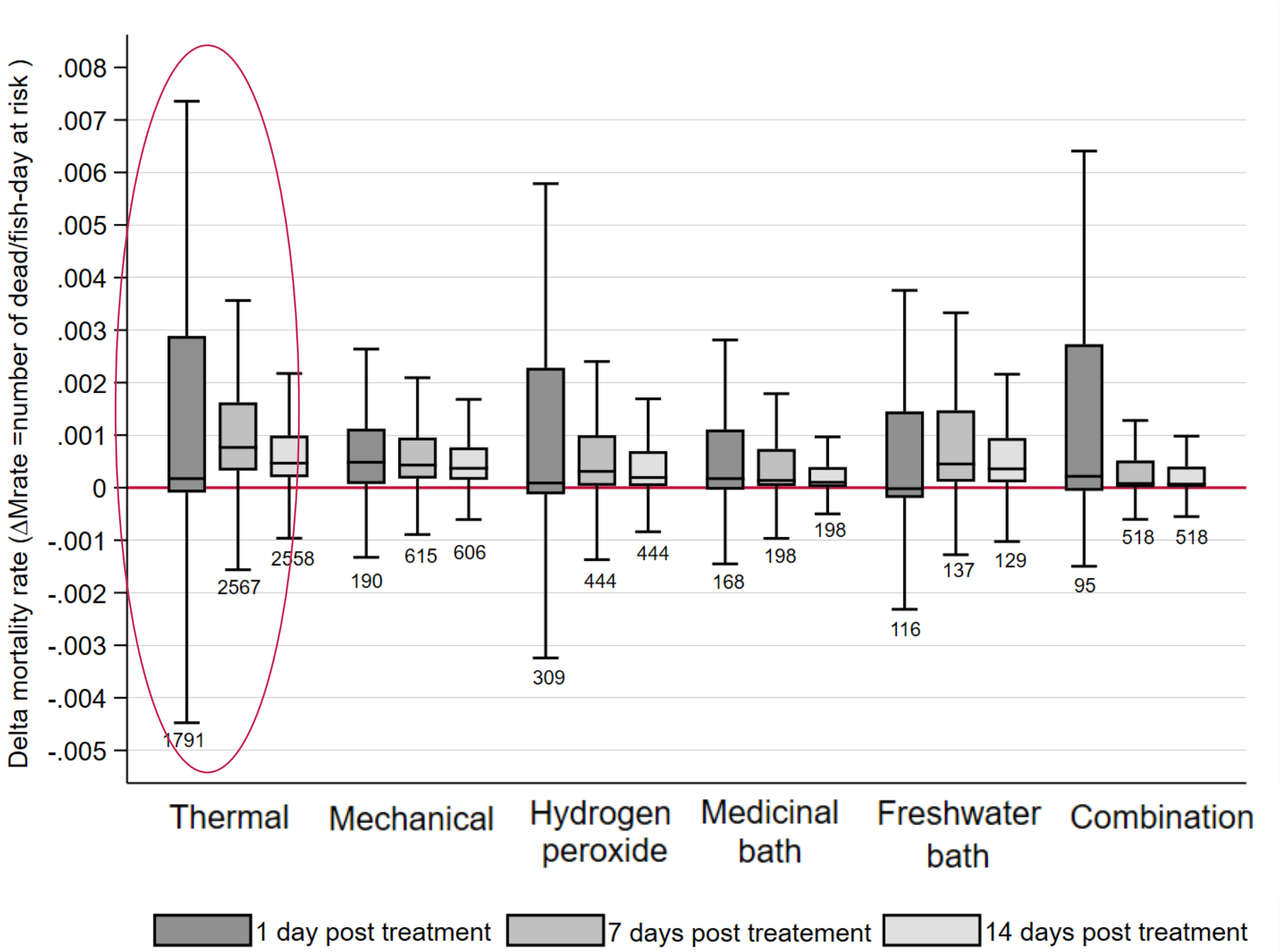
Foto: Jannicke Wiik-Nielsen
Veterinærinstituttet

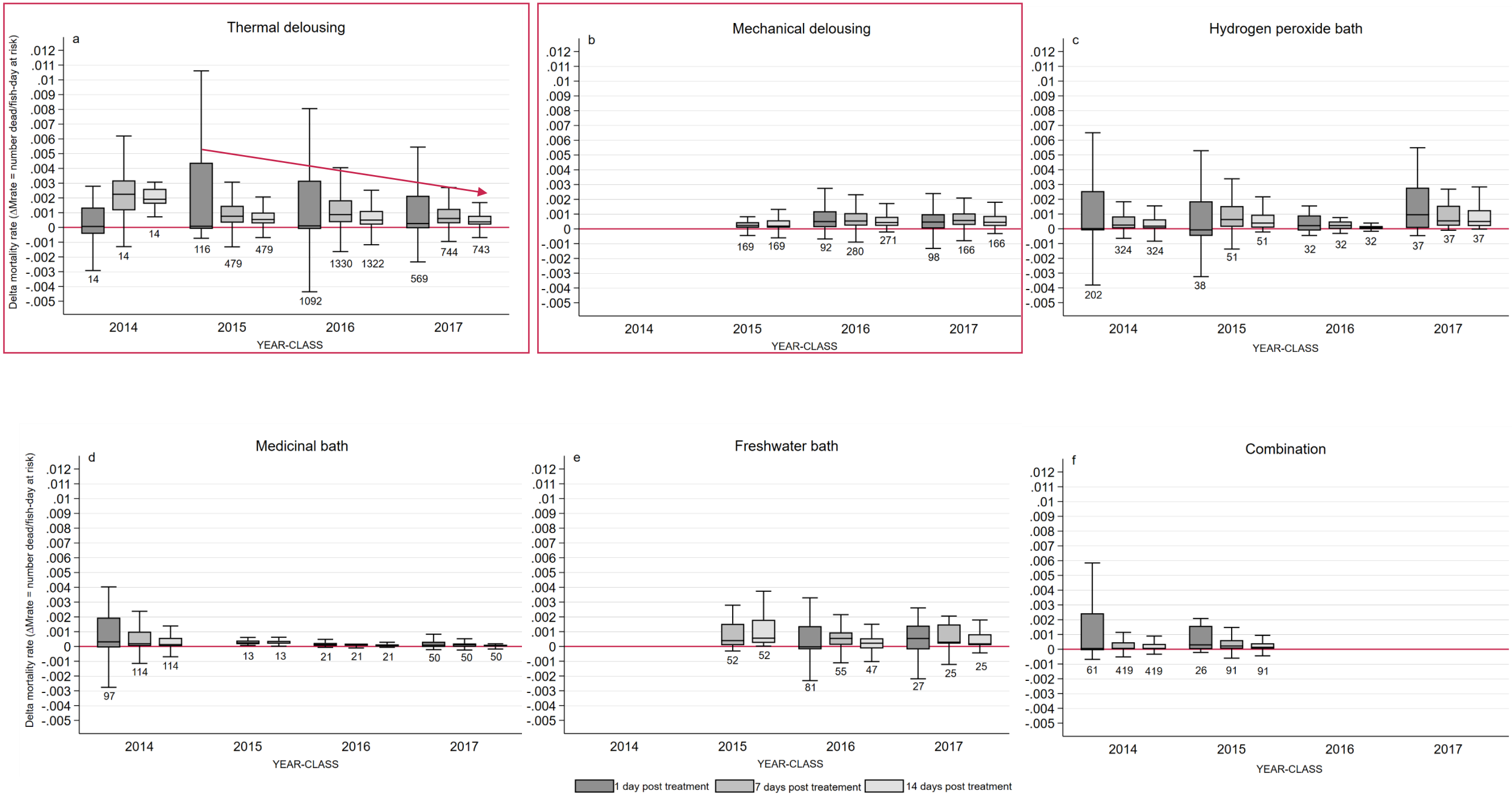
Frekvens distribusjon avlusningbehandlinger fra årsklasse 2014 to 2017					
	Årsklasse				
Avlusningskategori	2014	2015	2016	2017	Total
Termisk					2 692
Mekanisk					619
Ferskvannsbad					172
Hydrogen peroksid					445
Medisinsk bad					198
Kombinasjonsbehandling					518
Total					4 644

Foto: Jannicke Wiik-Nielsen
Veterinærinstituttet

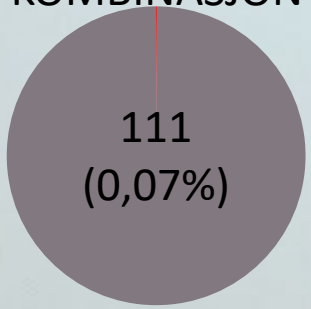
Frekvens distribusjon avlusningbehandlinger fra årsklasse 2014 to 2017					
	Årsklasse				
Avlusningskategori	2014	2015	2016	2017	Total
Termisk	14	481	1 449	748	2 692
Mekanisk	0	169	284	166	619
Ferskvannsbad	5	55	85	27	172
Hydrogen peroksid	324	52	32	37	445
Medisinsk bad	114	13	21	50	198
Kombinasjonsbehandling	419	91	8	0	518
Total	876	861	1 879	1 028	4 644

Foto: Jannicke Wiik-Nielsen
Veterinærinstituttet

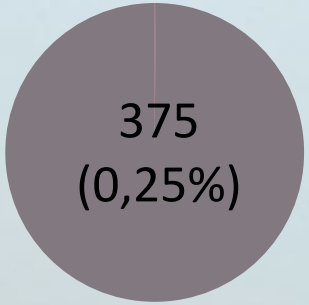

Delta mortality rate (ΔMrate =number of dead/fish-day at risk)
.008
.007
.006
.005
.004
.003
.002
.001
0
-.001
-.002
-.003
-.004
-.005
1791
2567
2558
190
615
606
309
444
444
168
198
198
116
137
129
95
518
518
Thermal
Mechanical
Hydrogen peroxide
Medicinal bath
Freshwater bath
Combination
1 day post treatment
7 days post treatement
14 days post treatment


Thermal delousing
a
Mechanical delousing
b
Hydrogen peroxide bath
c
Medicinal bath
d
Freshwater bath
e
Combination
f
Delta mortality rate (ΔMrate = number dead/fish-day at risk)
YEAR-CLASS
2014
2015
2016
2017
1 day post treatment
7 days post treatement
14 days post treatment

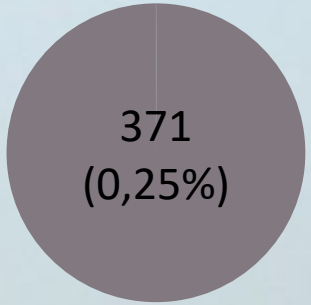
KOMBINASJON*



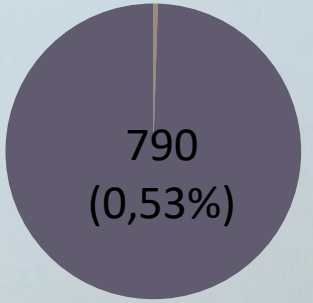
HYDROGEN PEROXIDE*



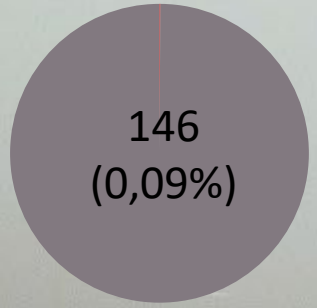
FERSKVANNSBAD

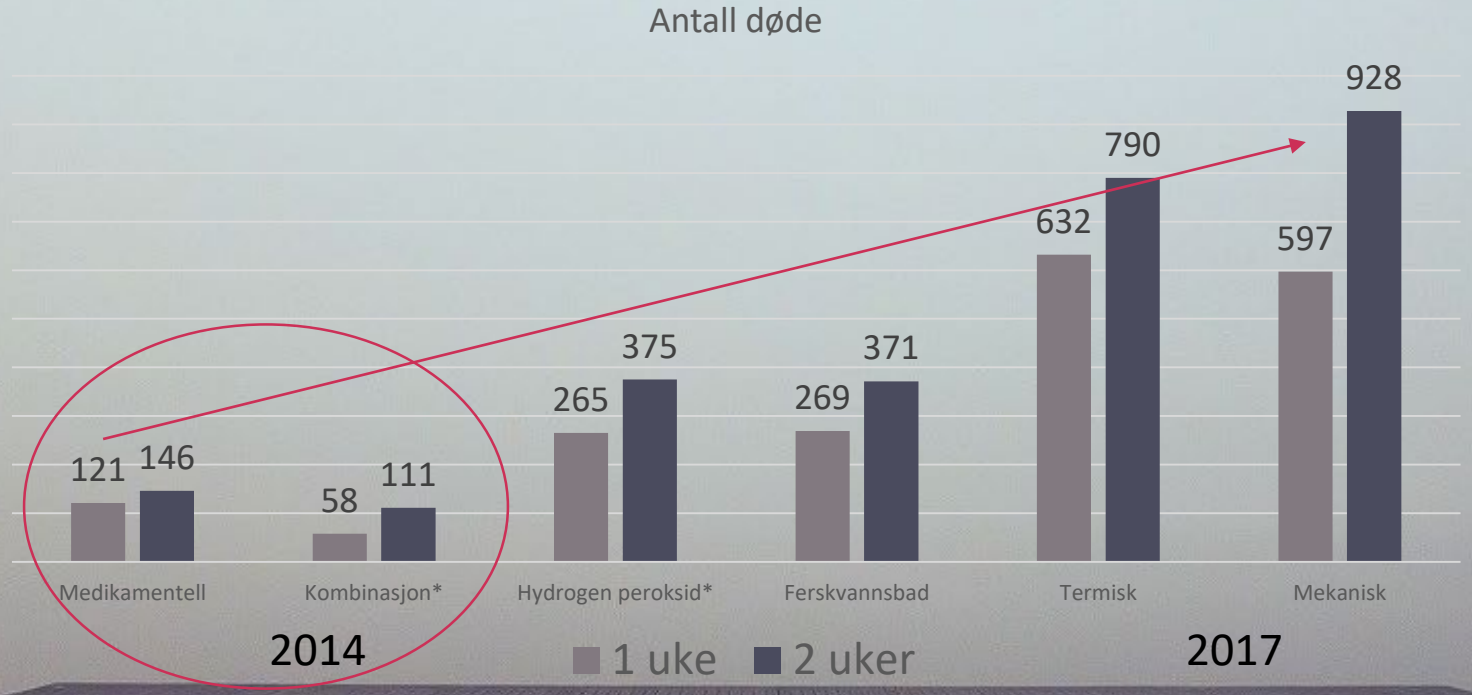


TERMISK

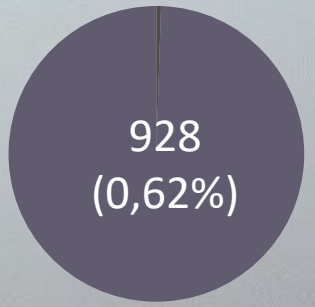


MEDIKAMENTELL





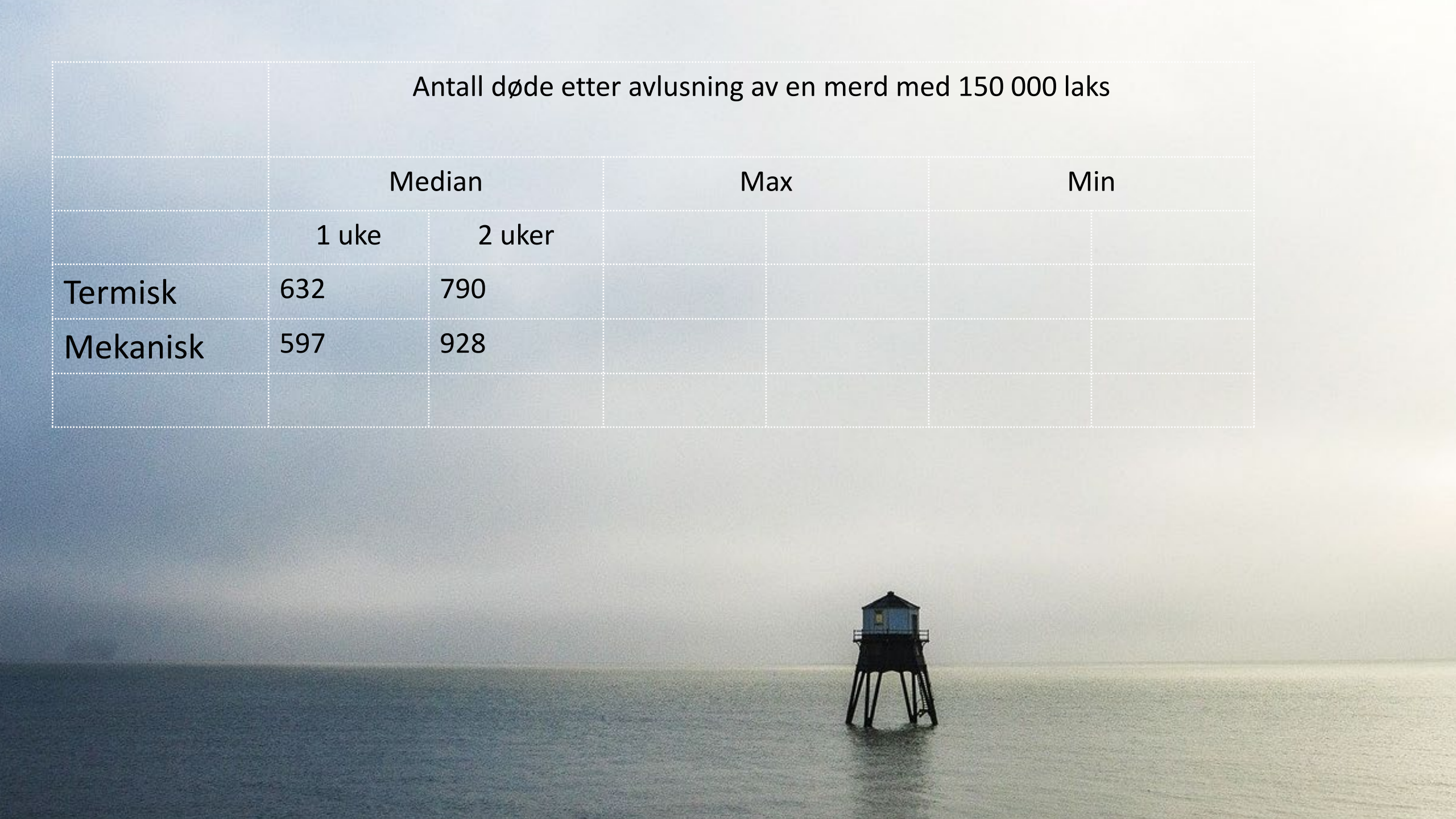
MEKANISK



MERD 150 000 FISK

Medianen er 5,4 (termisk) og 6,3 (mekanisk) ganger høyere enn medikamentell behandling

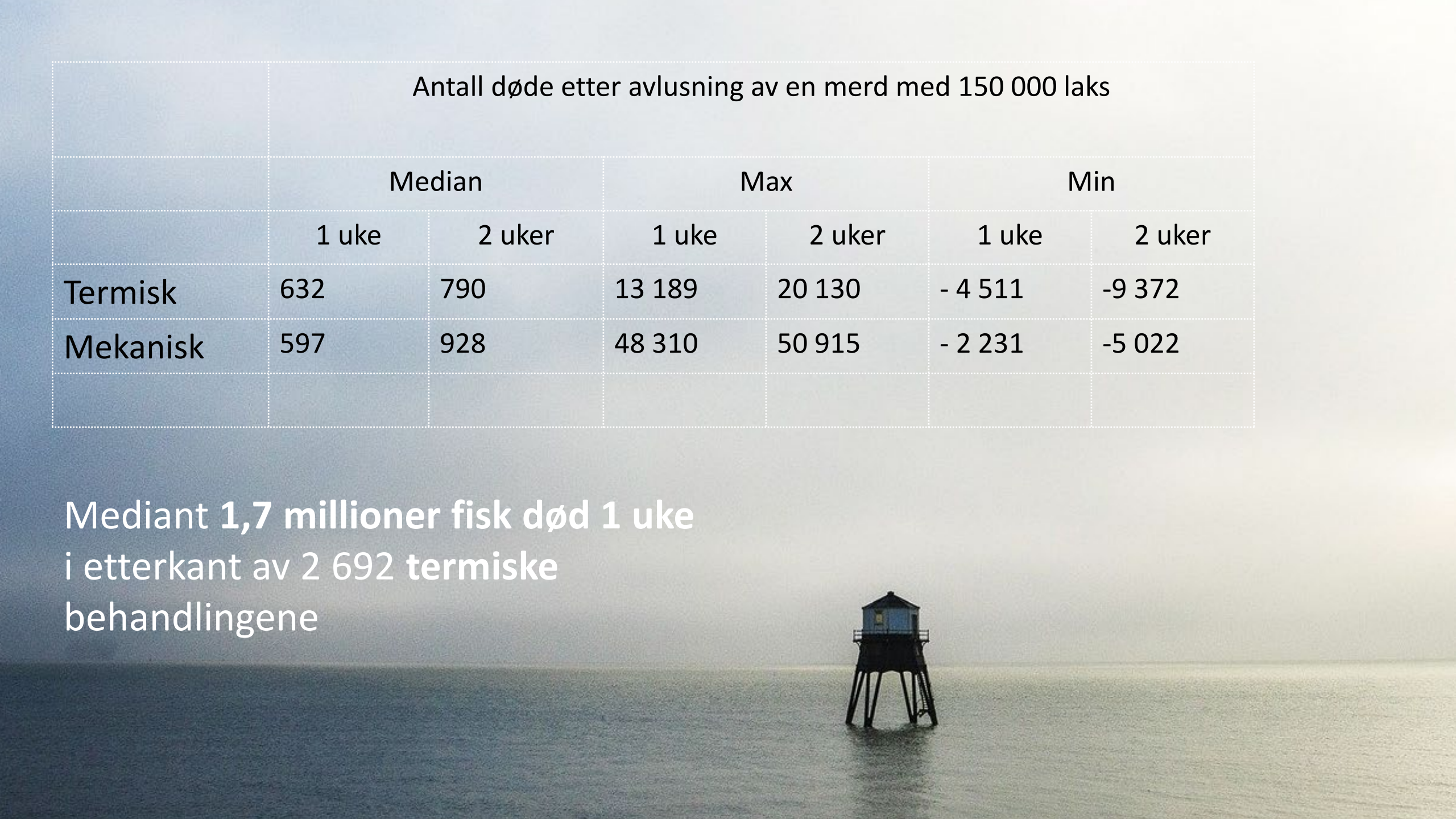
	Antall døde etter avlusning av en merd med 150 000 laks					
	Median		Max		Min	
	1 uke	2 uker				
Termisk	632	790				
Mekanisk	597	928				



	Antall døde etter avlusning av en merd med 150 000 laks					
	Median		Max		Min	
	1 uke	2 uker	1 uke	2 uker		
Termisk	632	790	13 189	20 130		
Mekanisk	597	928	48 310	50 915		

	Antall døde etter avlusning av en merd med 150 000 laks					
	Median		Max		Min	
	1 uke	2 uker	1 uke	2 uker	1 uke	2 uker
Termisk	632	790	13 189	20 130	- 4 511	-9 372
Mekanisk	597	928	48 310	50 915	- 2 231	-5 022

Mediant **1,7 millioner fisk død 1 uke**
i etterkant av 2 692 **termiske**
behandlingene



Dødeligheten i etterkant av alle avlusningsmetodene

Høyest for termisk og mekanisk

Variasjon i dødeligheten

Variasjonen utgjør en usikkerhet

Veterinærinstituttet
Norwegian Veterinary Institute

Takk for oppmerksomheten

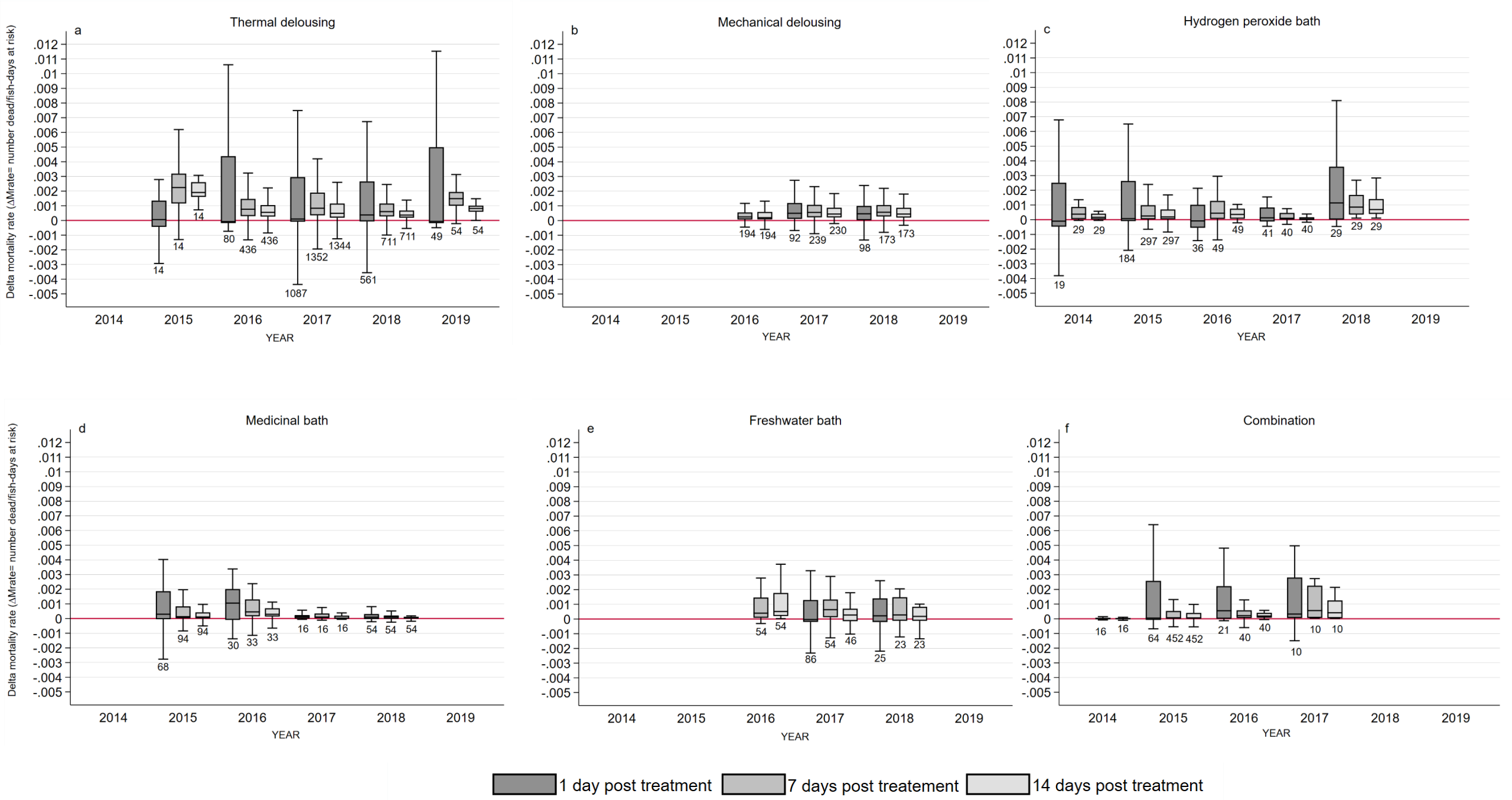
Categories (n=6) of delousing operations	Description of category of delousing operation
Thermal	Non-medicinal treatment using heated seawater. Includes all treatments using: a. Optilice ® b. Thermolicer c. Heated seawater
Mechanical	Non-medicinal treatment using brushing or flushing. Includes all treatments using: a. FLS Avlusersystem b. Hydrolicer c. SkaMik d. Flushing or mechanical treatment
Hydrogen peroxide	Hydrogen peroxide (H2O2) bath in pen or well boat
Medicinal bath	Medicinal bath in pen or well boat using one of the following active substances: a. Azametiphos b. Cypermethrin c. Deltamethrin d. Imidacloprid e. Other
Freshwater bath	Freshwater bath in pen or well boat
Combination	Treatment of the same cohort with two different delousing methods on the same day. Includes the following combinations: a. two different active substances b. hydrogen peroxide and medicinal bath

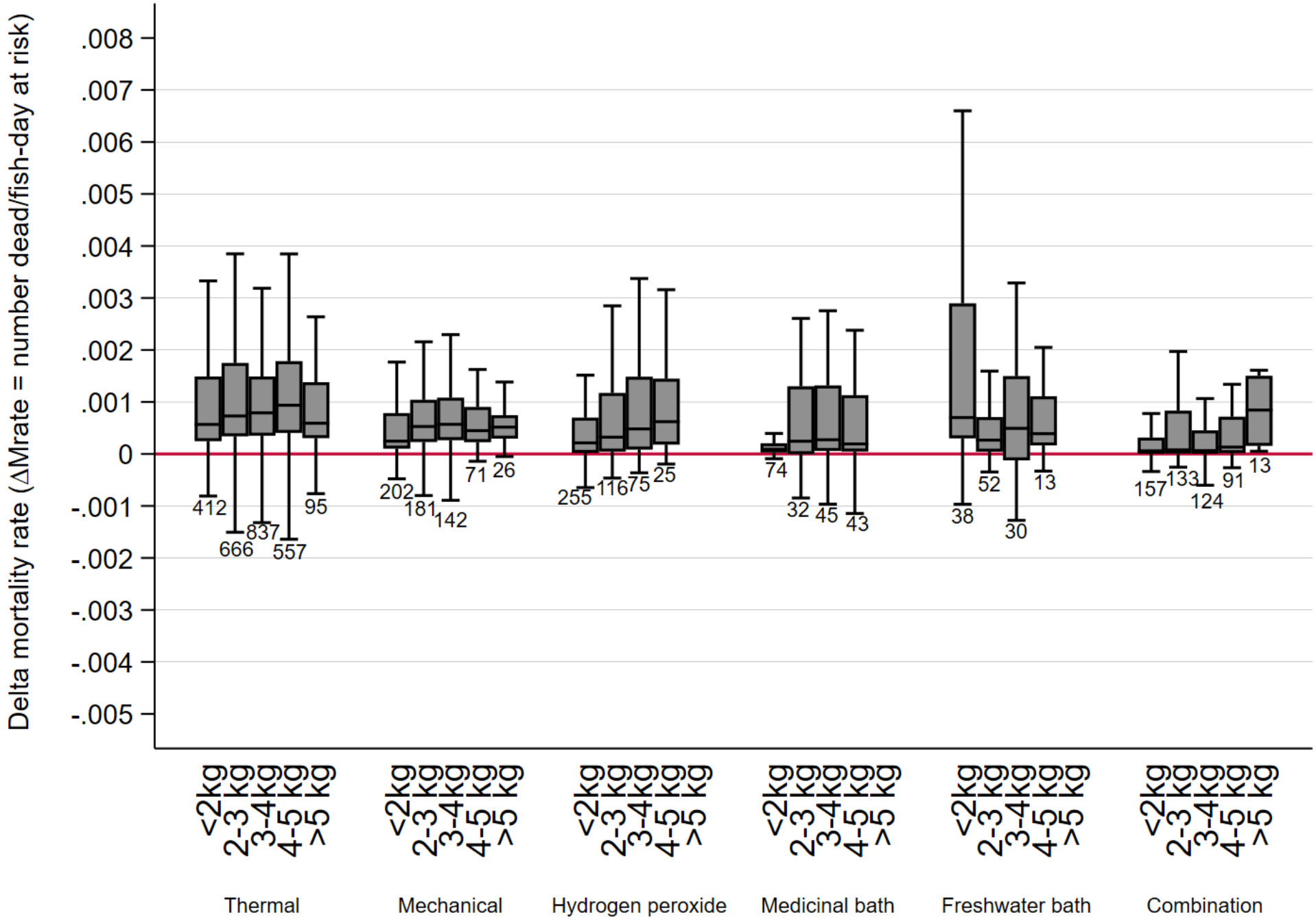
TABLE 3 Frequency distribution of delousing treatments from 2014 to 2019

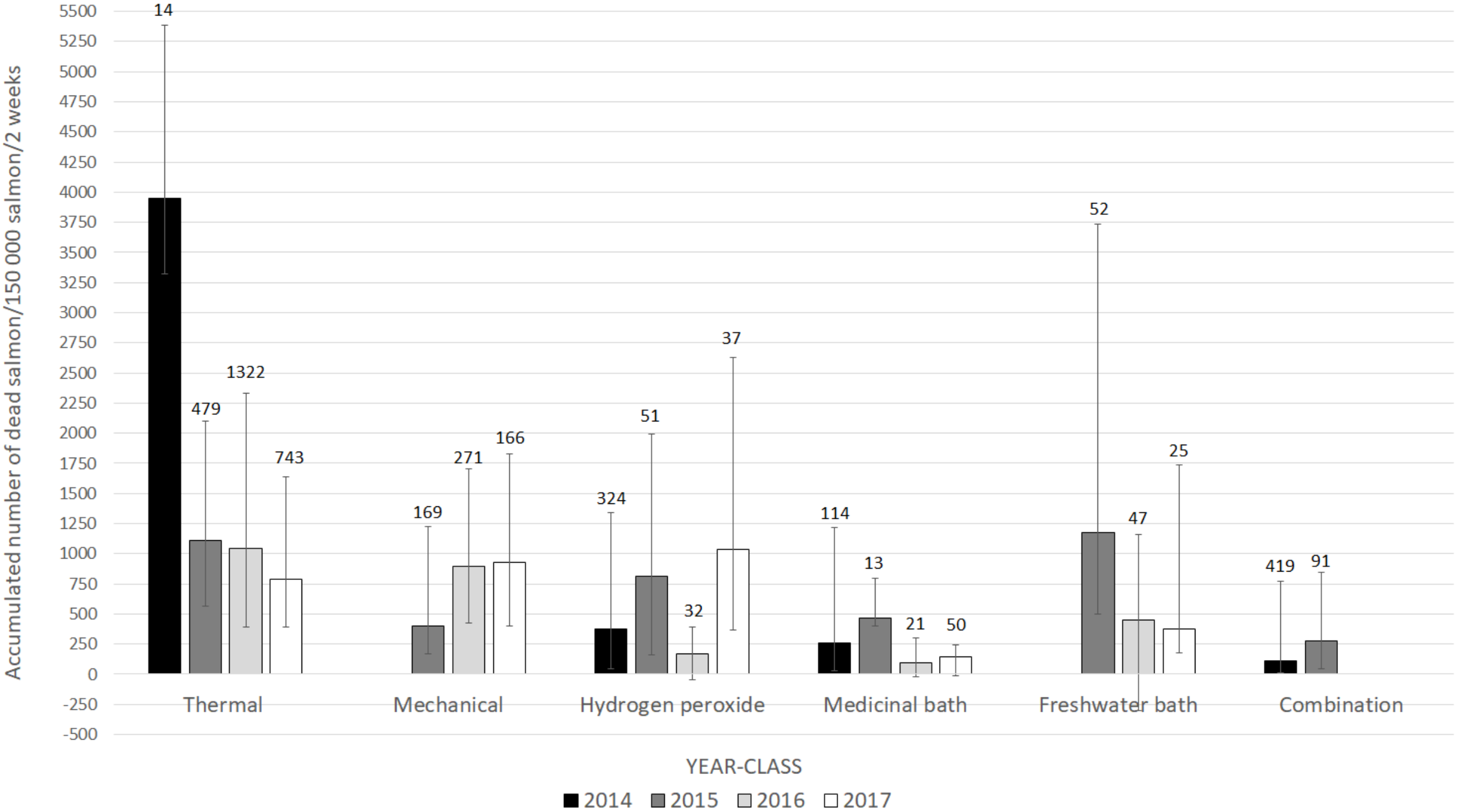
	Year						
Delousing category	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	Total
Thermal	0	14	436	1 446	738	58	2 692
Mechanical	0	9	194	243	173	0	619
Hydrogen peroxide	29	297	49	41	29	0	445
Medicinal bath	1	94	33	16	54	0	198
Freshwater bath	0	6	54	87	25	0	172
Combination	16	452	40	10	0	0	518
Total	46	872	806	1 843	1 019	58	4 644

TABLE 5 Frequency distribution of delousing treatments over production areas

	Production area ID										
Delousing category	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**11**	Total
Thermal	47	207	272	523	398	790	272	133	19	31	2 692
Mechanical	1	3	16	7	54	337	125	62	7	7	619
Hydrogen peroxide	0	70	177	61	52	60	25	0	0	0	445
Medicinal bath	15	97	4	32	11	25	0	3	0	11	198
Freshwater bath	0	2	8	0	19	137	6	0	0	0	172
Combination	0	0	41	17	110	309	35	0	6	0	518
Total	63	379	518	640	644	1 658	463	198	32	49	4 644


a
Thermal delousing
b
Mechanical delousing
c
Hydrogen peroxide bath
d
Medicinal bath
e
Freshwater bath
f
Combination
Delta mortality rate (ΔMrate= number dead/fish-days at risk)
YEAR
1 day post treatment
7 days post treatement
14 days post treatment


Delta mortality rate (ΔMrate = number dead/fish-day at risk)
.008
.007
.006
.005
.004
.003
.002
.001
0
-.001
-.002
-.003
-.004
-.005
412
666
837
557
95
202
181
142
71
26
255
116
75
25
74
32
45
43
38
52
30
13
157
133
124
91
13
<2kg
2-3kg
3-4kg
4-5kg
>5kg
Thermal
Mechanical
Hydrogen peroxide
Medicinal bath
Freshwater bath
Combination


Accumulated number of dead salmon/150 000 salmon/2 weeks
5500
5250
5000
4750
4500
4250
4000
3750
3500
3250
3000
2750
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
-250
-500
14
479
1322
743
169
271
166
324
51
32
37
114
13
21
50
52
47
25
419
91
Thermal
Mechanical
Hydrogen peroxide
Medicinal bath
Freshwater bath
Combination
YEAR-CLASS
2014
2015
2016
2017