

SEA LICE MULTINATION workshop

Trondheim, 11 - 12 November 2013

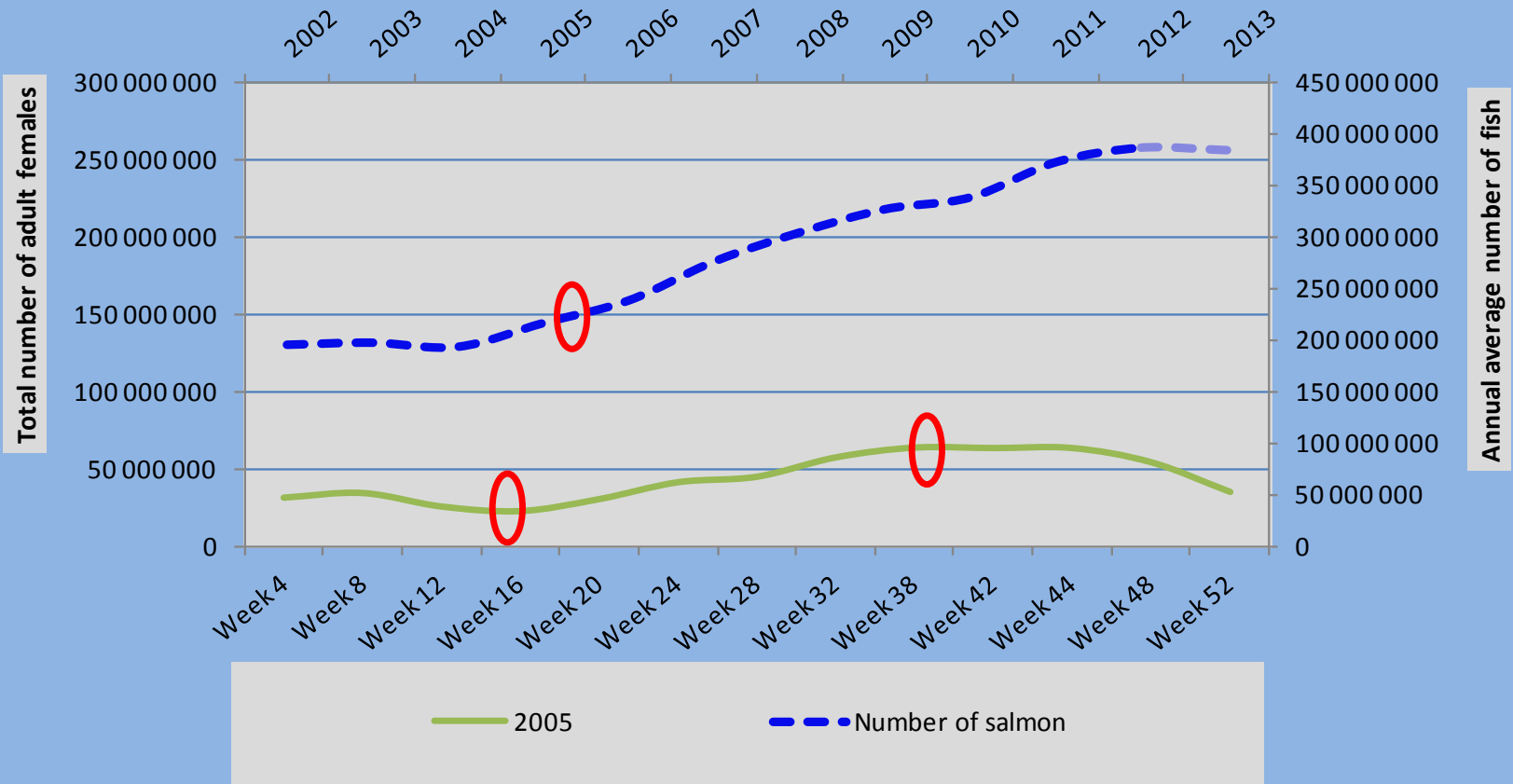
Ketil Rykhus
Norwegian Seafood Federation



SEA LICE IN THE PAST

Norway

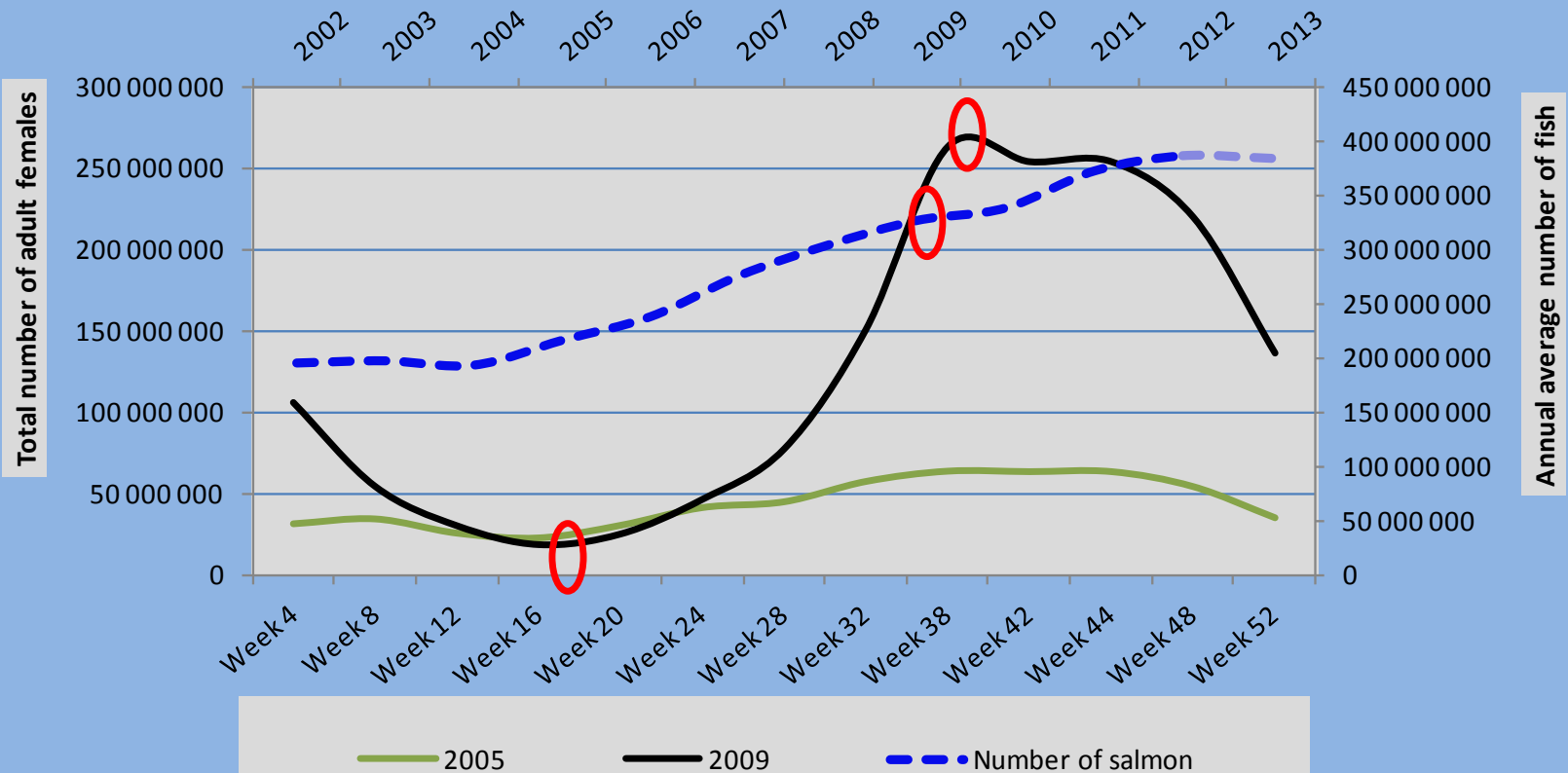
Total number of adult females and total number of salmon



SEA LICE IN THE PAST

Norway

Total number of adult females and total number of salmon



SEA LICE IN A LICE SHELL

- adult females before (and now)

| Year | Average number of fish | MAY | | SEPTEMBER | |
|------|------------------------|-------------------------------|--|-------------------------------|--|
| | | Total number of adult females | Average number of adult females per fish | Total number of adult females | Average number of adult females per fish |
| 2002 | 200 mill. | 46 mill. | 0,2 | 118 mill. | 0,6 |
| 2005 | 227 mill. | 30 mill. | 0,1 | 63 mill. | 0,3 |
| 2009 | 340 mill. | 25 mill. | 0,07 | 262 mill. | 0,7 |

INTEGRATED SEA LICE CONTROL

“Integrated pest management is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.”

US Environmental Protection Agency

SEA LICE CONTROL

- main goal

Persistent low levels of sea lice on farmed fish

SEA LICE CONTROL

- main strategy

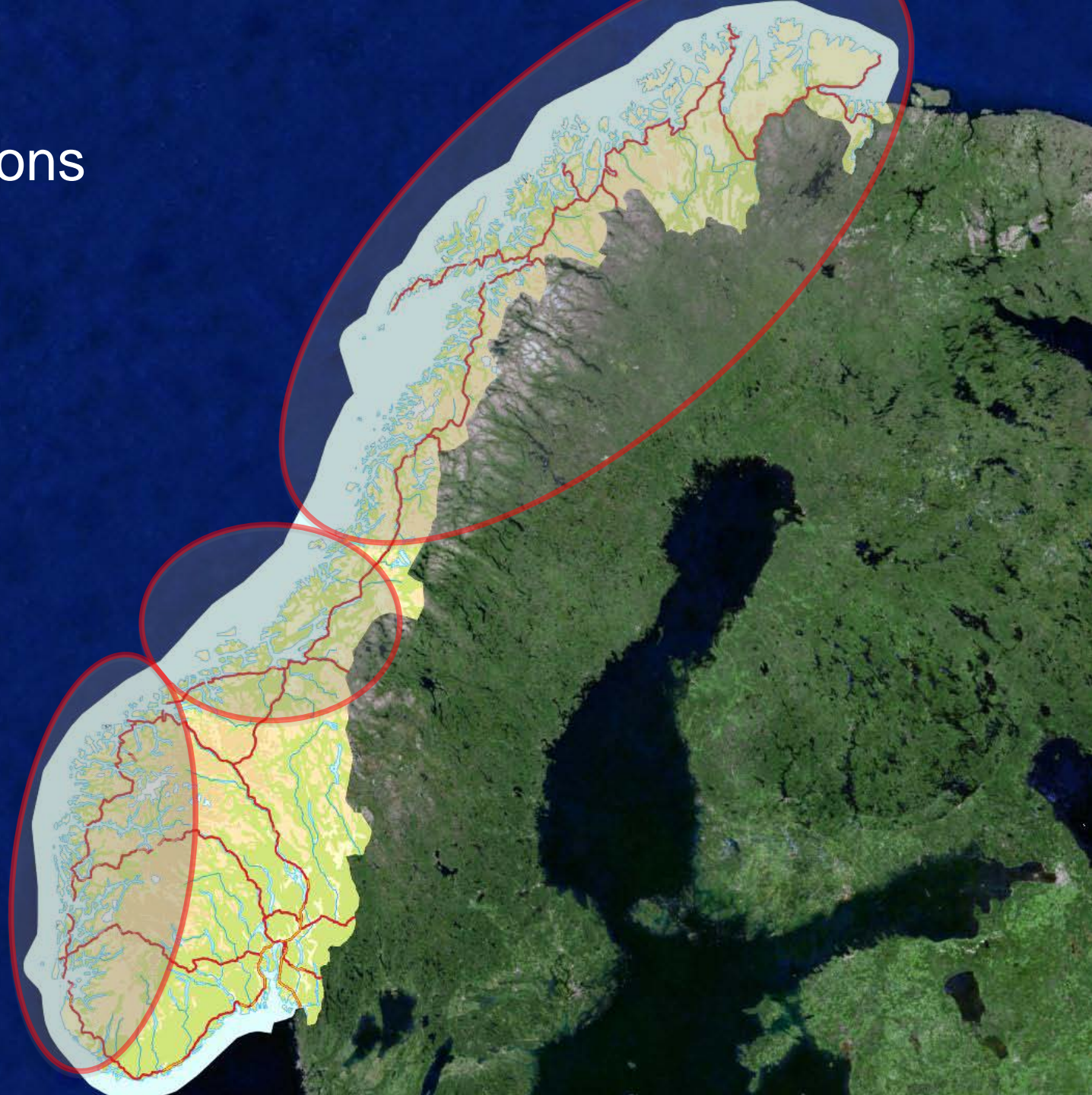
1. Appropriate geographical location of the farms
2. When necessary, coordinated fallowing in appropriate zones
3. Non-medicated control of sea lice in the cages
4. Coordinated removal of sea lice in aquaculture through biological and mechanical measures, and if necessary, by coordinated medicated treatment based on agreed criteria

SEA LICE CONTROL

- prerequisites

- Organisation (farm - zone - area - region - country)
- Written agreements (areas)
- Operational plans (farm level)
- Coordinating plans (zone level)
- Guidelines for
 - sea lice counting
 - harvesting, transport and keeping of cleaner fish
 - medicated treatments (closed tarpaulin, well-boat)
 - treatment evaluations

3 regions



17 areas

>100 zones

App. 550 farms

App. 1 400 sites approved

App. 4 000 cages



SEA LICE CONTROL

- prerequisites

- Organisation (farm - zone - area - region - country)
- Written agreements (areas)
- Operational plans (farm level)
- Coordinating plans (zone level)
- **Guidelines for**
 - sea lice counting
 - harvesting, transport and keeping of cleaner fish
 - medicated treatments (closed tarpaulin, well-boat)
 - treatment evaluations

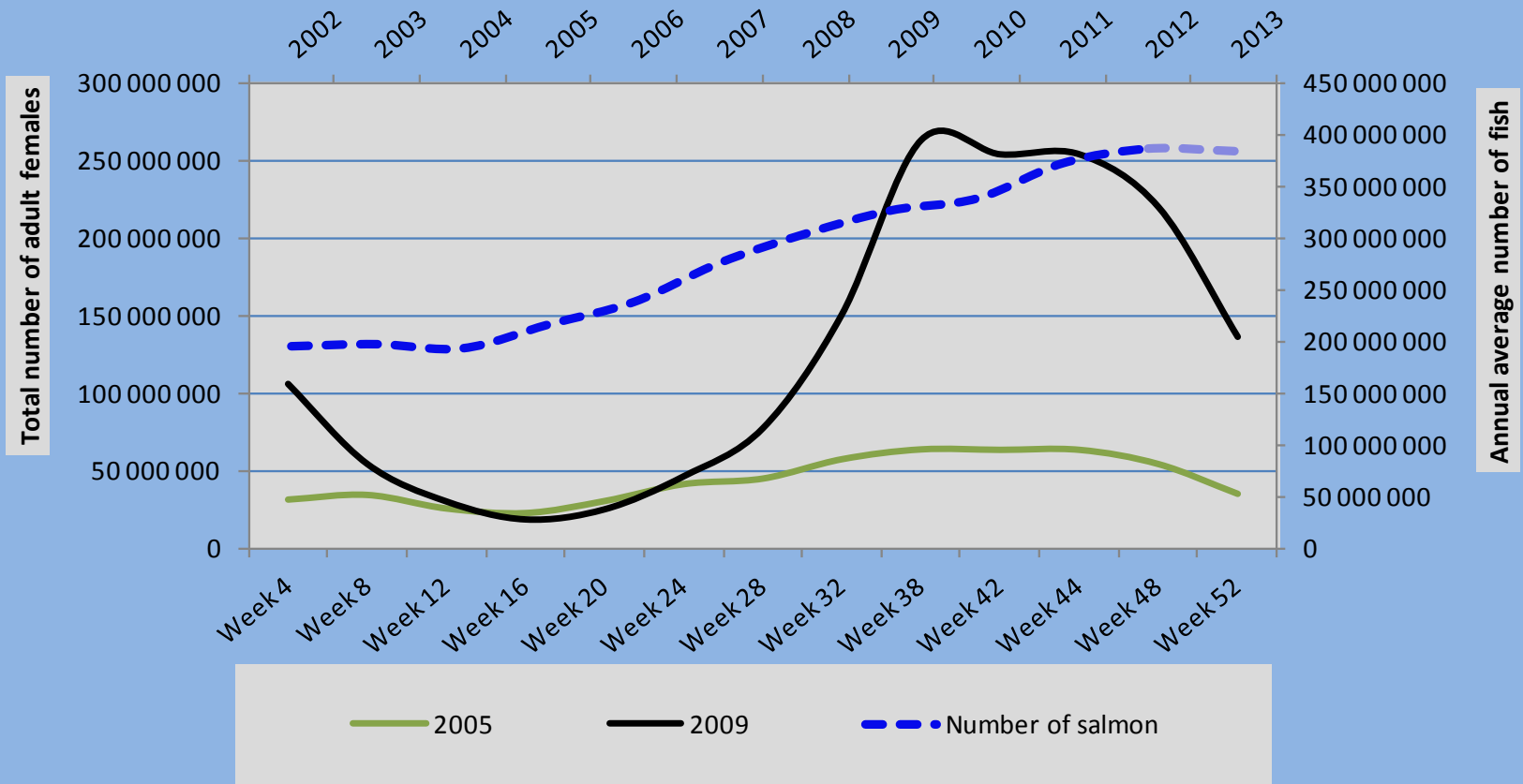
SEA LICE IN A LICE SHELL

2013:

- Counting sea lice on more than 1.1 million fish
 - App. 22 000 fish per week
-
- On average 550 sites reporting data per week
 - Average 8 cages per site
 - 10 fish from 4 cages on each site counted every week

SEA LICE NOW?

Norway
Total number of adult females and total number of salmon



SEA LICE IN A LICE SHELL

- adult females before and now

| Year | Average number of fish | MAY | | SEPTEMBER | |
|------|------------------------|-------------------------------|--|-------------------------------|--|
| | | Total number of adult females | Average number of adult females per fish | Total number of adult females | Average number of adult females per fish |
| 2002 | 200 mill. | 46 mill. | 0,2 | 118 mill. | 0,6 |
| 2005 | 227 mill. | 30 mill. | 0,1 | 63 mill. | 0,3 |
| 2009 | 340 mill. | 25 mill. | 0,07 | 262 mill. | 0,7 |
| 2013 | 410 mill. | 12 mill. | 0,03 | 112 mill. | 0,3 |

TODAYS CONTROL REGIME

Medicated treatment
and
biological
removal

SCHEDULED COMMERCIALIZATION OF NON-MEDICATED CONTROL MEASURES

| | | | | | | | |
|-----------------------|------------------------|------------------|-----------------------------|-----------------------------------|-------------------|-------------------|-------------------------------------|
| | | | BOLAKS (ferskvann) | | | | |
| | | | GLAXUS (blåskjell) | | | | |
| | | | BIOMAR (Focus lice Q) | | | | |
| | | | SKRETTING (Protec 2) | FJORDFORSK SOGN (blåskjell) | | | HI (felle) |
| | | | FLATSETSUND (spyler) | EWOS (Robust II) | | | CTM LYNG (mekanisk) |
| | | | SKAMIK (mekanisk) | SKRETTING (Target 2) | | | |
| SKRETTING (Protec) | | | AKVAFUTURE (lukket pose) | EGERSUND G. (snorkel) | | | KYST- INKUBATOREN (ferskvann) |
| SKRETTING (Target) | BIOMAR (Focus lice) | | BOTNGAARD (permaskjørt) | BECK (optisk) | | | VI (vaksine) |
| RENSEFISK | SALMOBREED (avl) | EWOS (Robust) | CALANUS (planktonduk) | SFD/IRIS (strøm) | OCEA (termisk) | AQUA GEN (avl) | SLRC (vaksine) |

VANN

BLÅSKJELL
RENSEFISK

FÔR

MEKANISK

SKJERMING

OPTISK

STRØM

AVL

2011

2012

2013

2014

2015

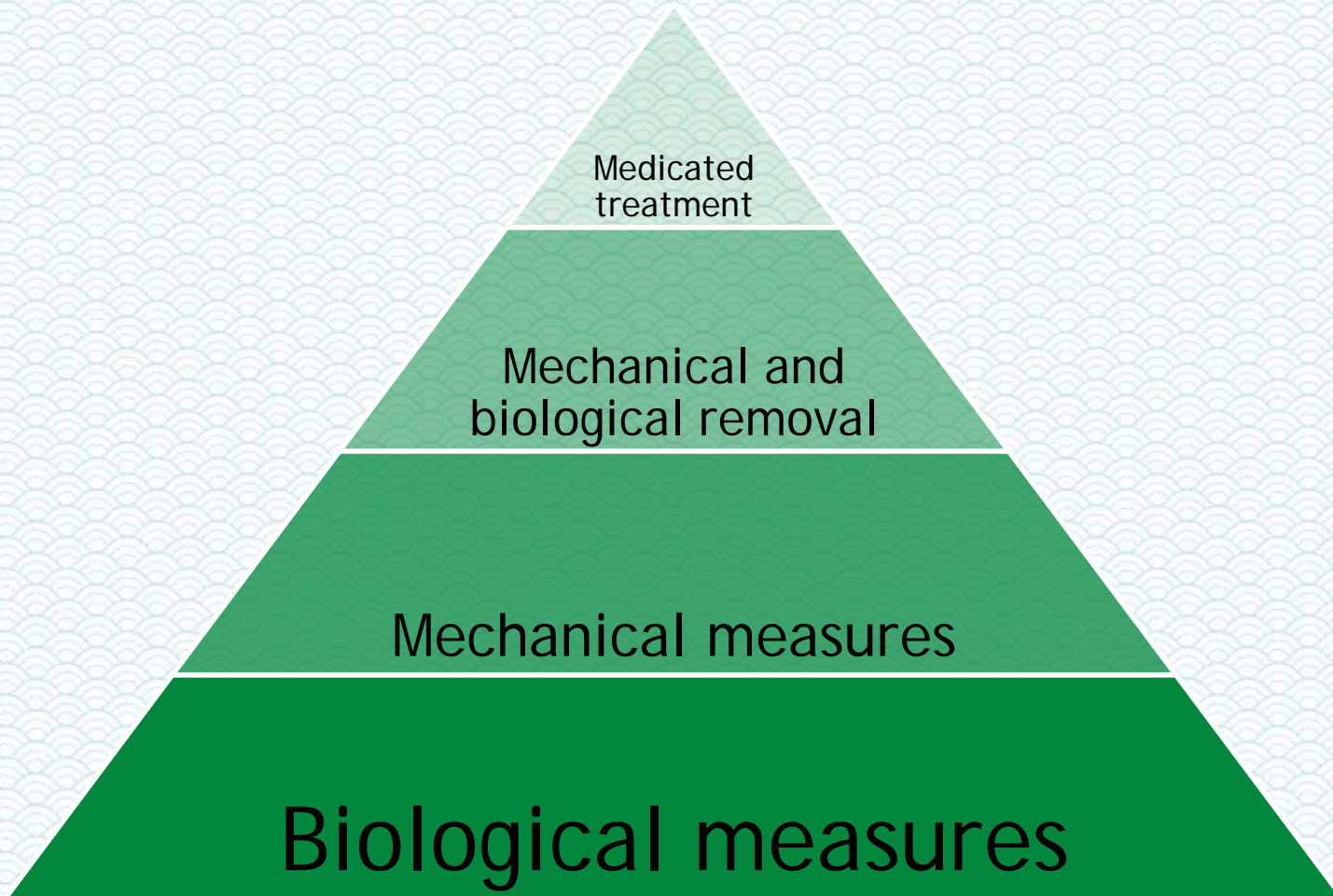
2016



TODAYS CONTROL REGIME

Medicated treatment
and
biological
removal

TOMORROWS CONTROL REGIME



MAIN CHALLENGES

- Sea lice sensitivity and resistance against drugs
- More efficient, more accurate and more animal welfare-friendly methods for counting early stages (chalimus and mobile)
- Wild smolt migration period determining the coordinated medicated spring campaigns
- Progress in developing non-medicated alternatives
- Commercialization and utilization of new measures

