

*Nordic RAS workshop 2018*  
Oslo, November 19- 20<sup>th</sup>, NMBU

# Common Infections seen in Norwegian Salmon RAS

Brit Hjeltne



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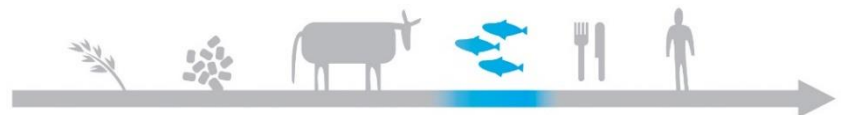
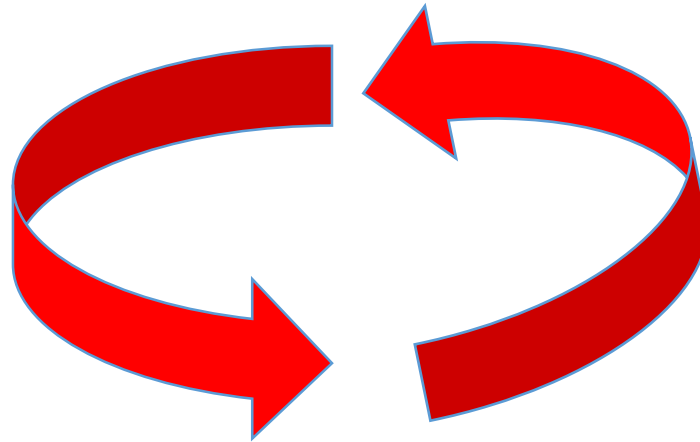
# Principals, diseases, trends



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# Recirculation



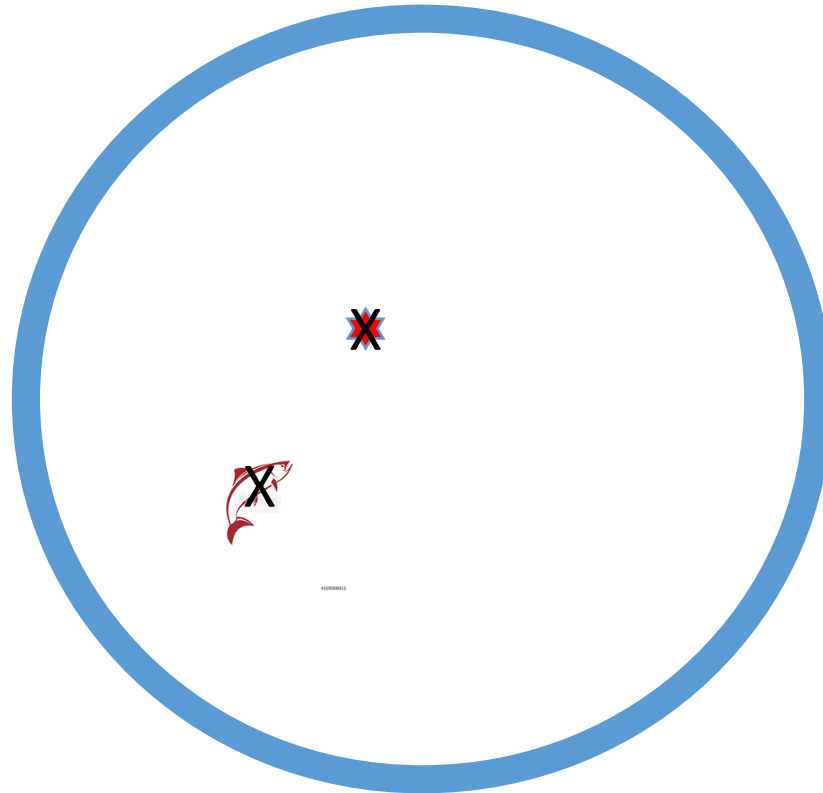
# Furunculosis

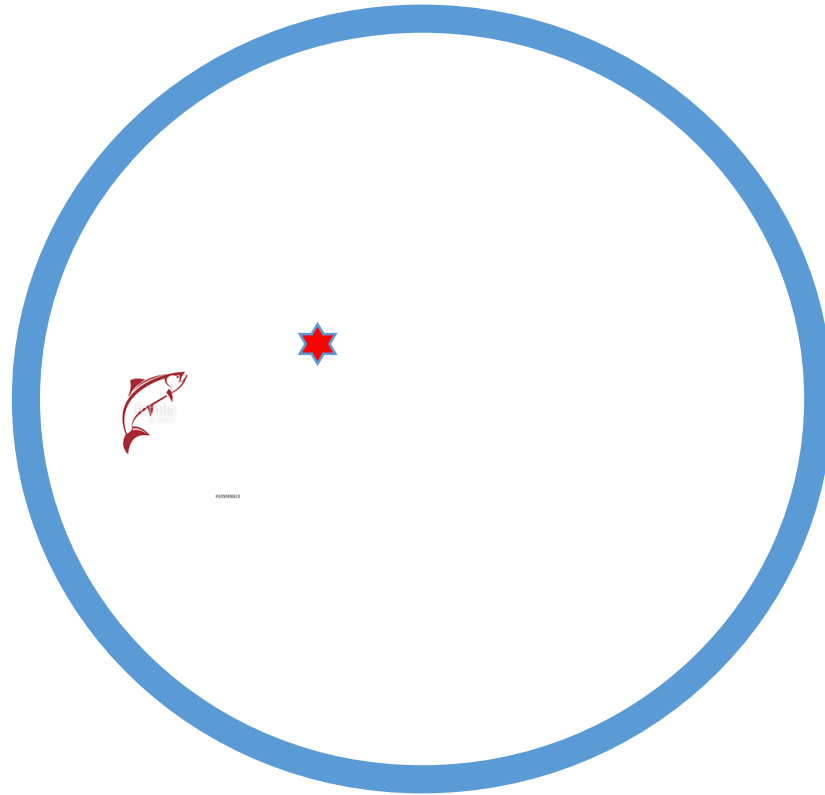
*Aeromonas salmonicida* subsp. *salmonicida*

- Old RAS in Norway and Scotland (Atlantic salmon)
- RAS Denmark (Atlantic salmon)
- Very high mortalities



# All in – all out



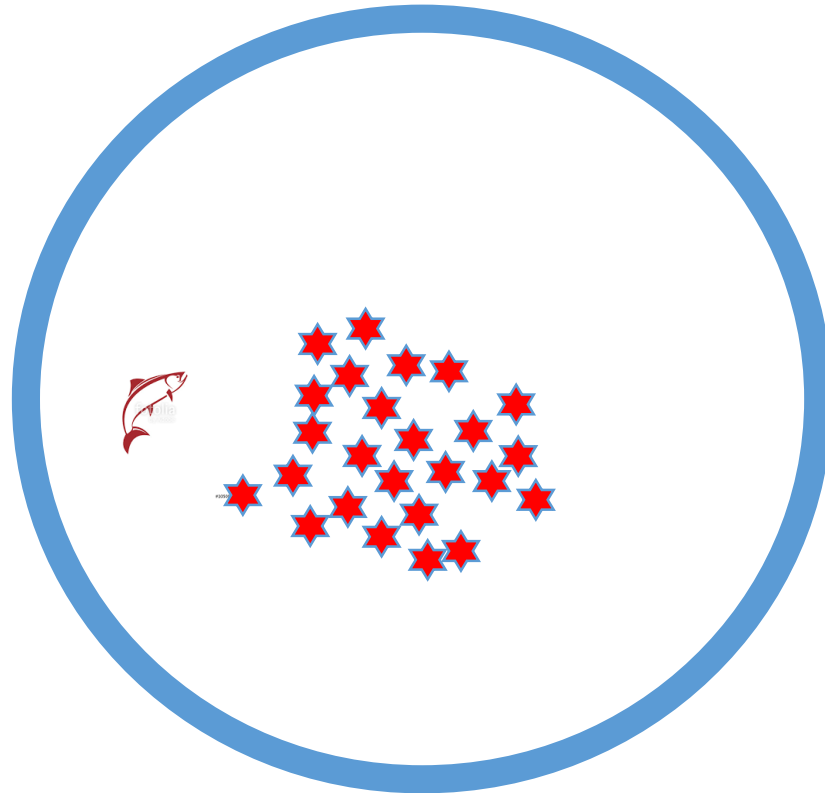


RAS



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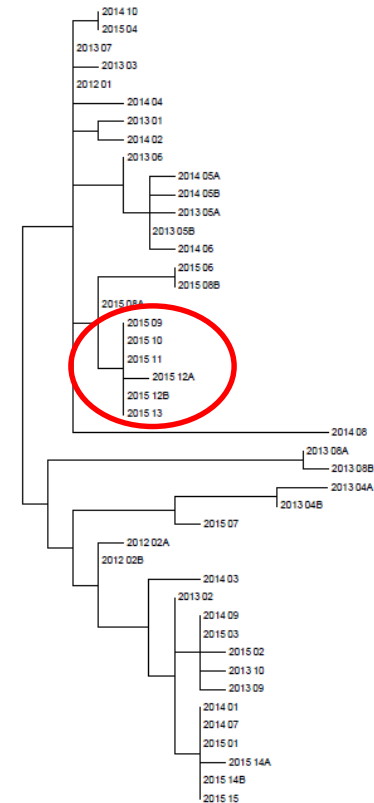
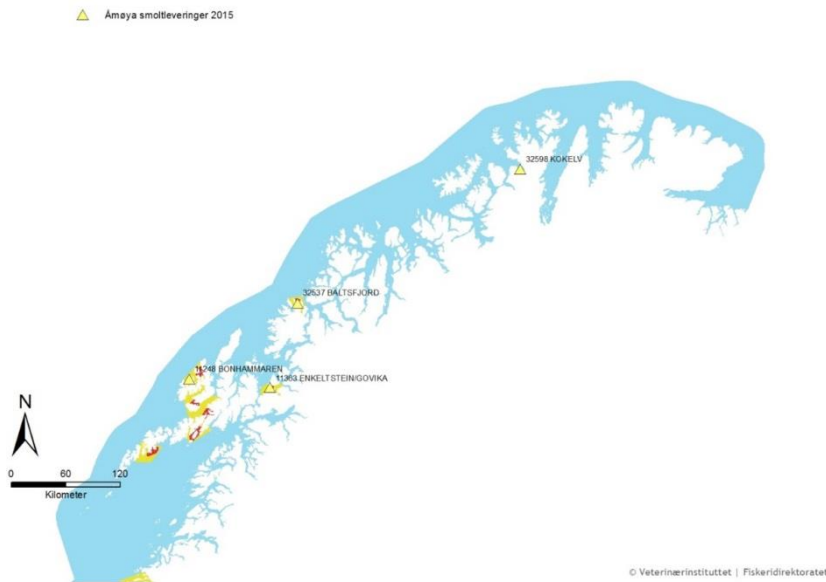
RAS



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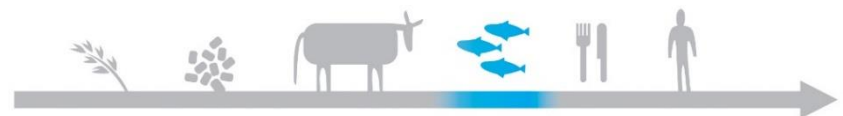
# ISA in smolt shortly after sea-transfer



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# ISAV HPR0 to ISAV HPR $\Delta$ in the hatchery

DNA Sequences		Translated Protein Sequences	
Species/Abbrv	Group Name	*****	*****
1. P343_HPR_F		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
2. P351_HPR_F		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
3. P352_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
4. P354_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
5. P355_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
6. P357_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
7. P358_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
8. P401_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
9. P402_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	
10. P403_HPR		AGATGTTAAAGATCAGGGTAGACGCAATCCCACTTCAGCTGAAACCAACATTCATATACAAACCAAGTAGAGCAACCTGCGCATCTGTGTIGASTAACA	

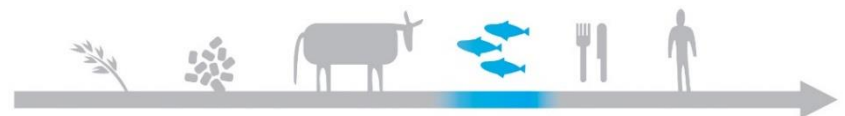
Closely related ISAV HPR0 and ISAV HPR $\Delta$  detected in February and June respectively



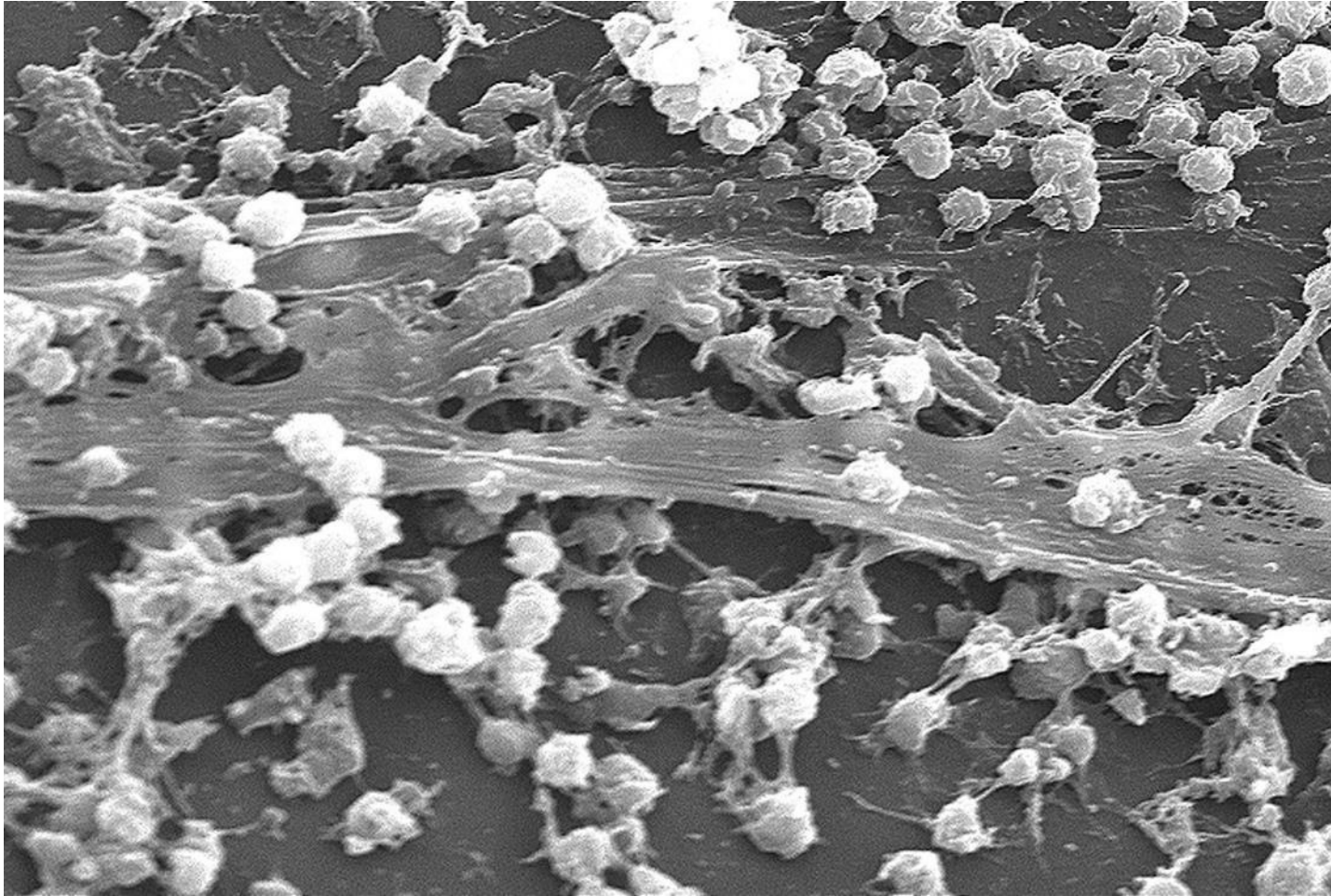
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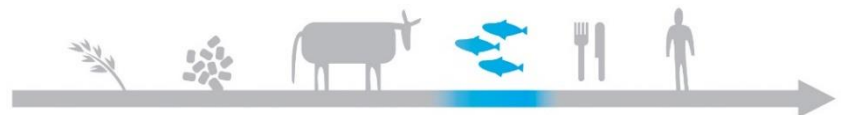
# BIOFILM



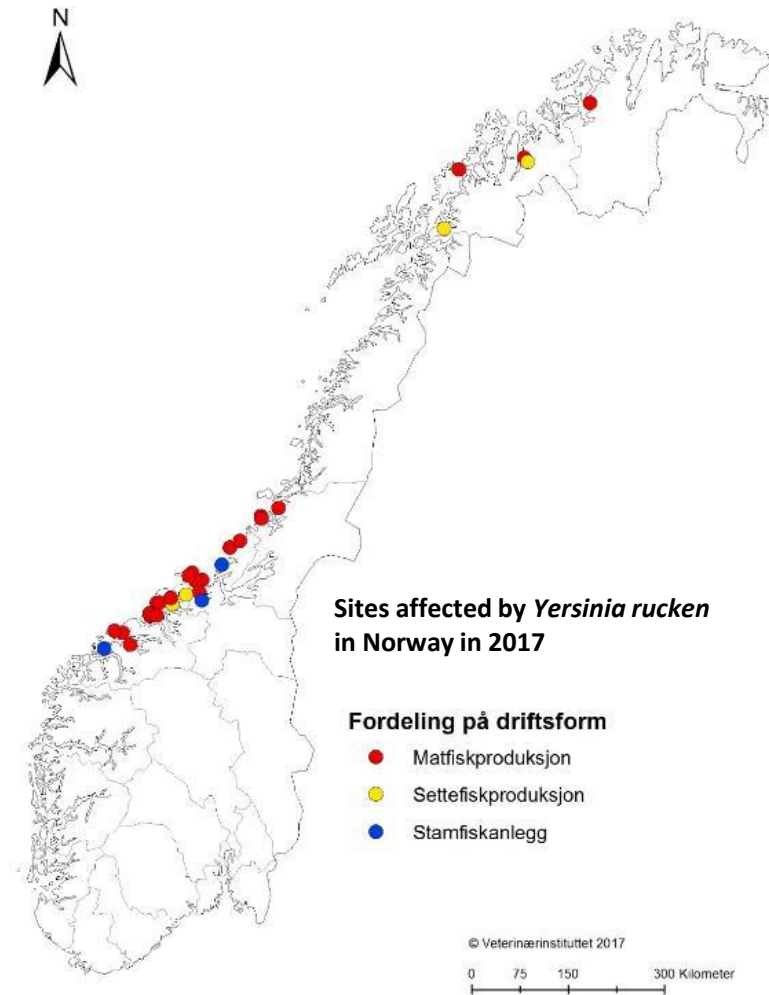
wikipedia



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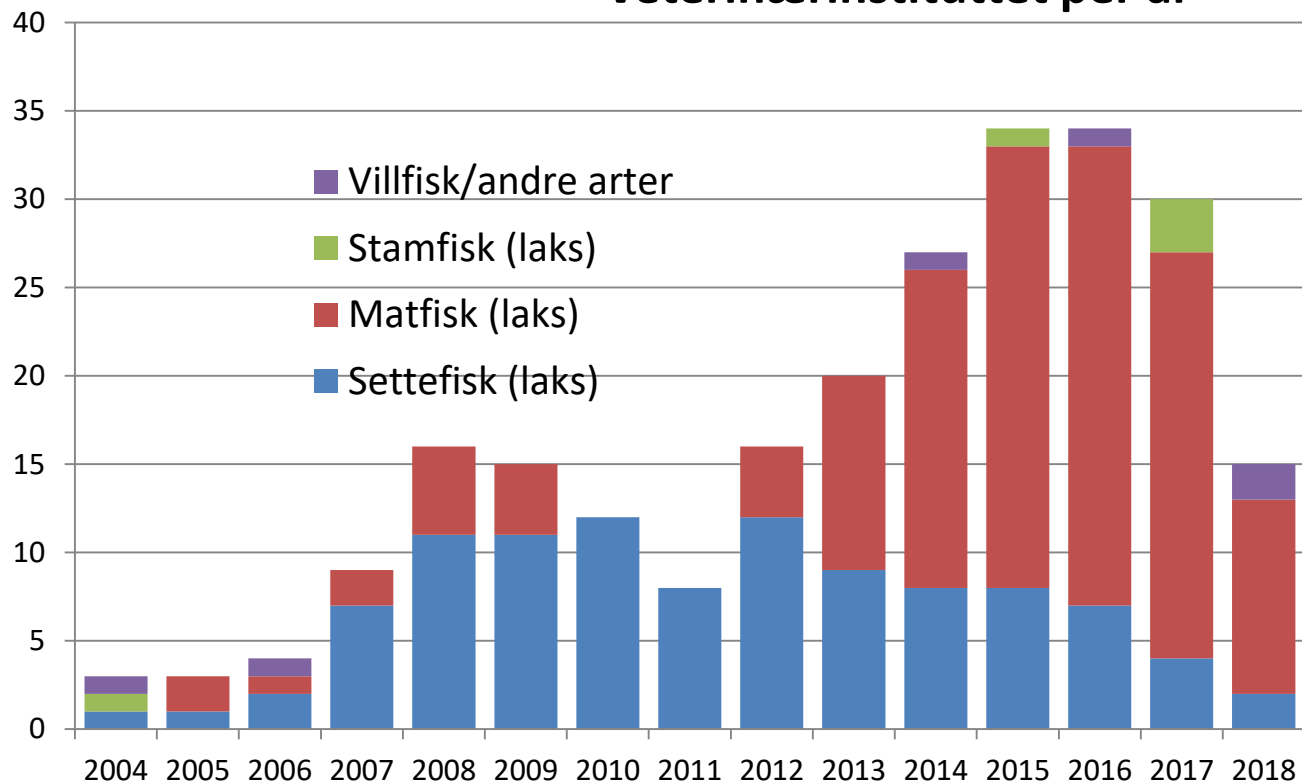
# Yersiniosis *Yersinia ruckeri*



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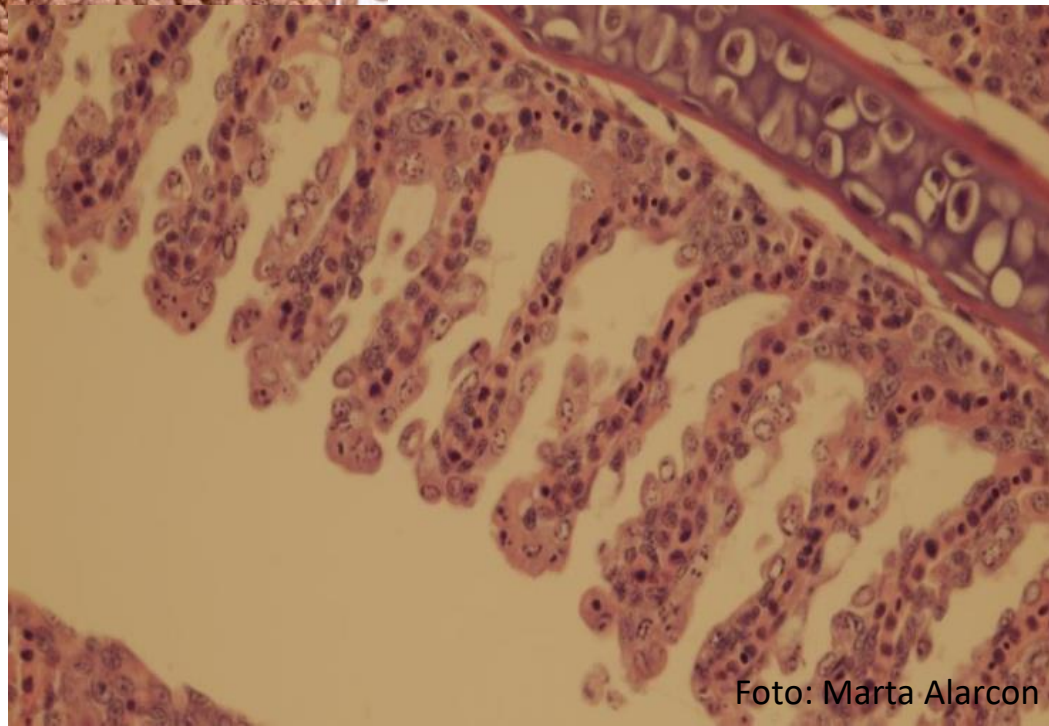


## Antall lokaliteter med *Y. ruckeri* påvisning hos Veterinærinstituttet per år





# Water quality



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Foto: Marta Alarcon

# Which diseases do we find in Norwegian RAS?

- Diseases found in flow trough systems
- Some seem to be more frequent, but not enough information to conclude



Data

**Notifiable diseases:**

Data from NVI

**Non-notifiable diseases:**

Data from NVI

Data from private laboratories

Data from a questionnaire

Score: 1-5

Official data



# Fish health problems in 16 RAS hatcheries

	Min	Max	Average (N=16)
Pox	1	5	2,4
HSMB	1	4	2,4
IPN	1	4	1,9

Score (1-5) on severity of health problems in 16 RAS hatcheries.





# Fish health problems in 16 RAS hatcheries

	min	max	Average (N=16)
<b><i>Yersinia</i></b>	<b>1</b>	<b>5</b>	<b>2,8</b>
<i>Branchiomonas/epiteliocystis</i>	1	4	2,2
<i>Pseudomonas sp</i>	1	4	1,7
<i>Flavobacterium psychrophilum</i>	1	4	1,7

Score (1-5) on severity o health problems in 16 RAS hatcheries



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# Fish health problems in 16 RAS hatcheries

	min	max	Average (N=16)
<b>HSS</b>	<b>1</b>	<b>4</b>	<b>2,6</b>
Saprolegnia	1	3	2,2
Desmozoon	1	4	1,7

Score (1-5) on severity of health problems in 16 RAS hatcheries.



# Fish health problems in 16 RAS hatcheries

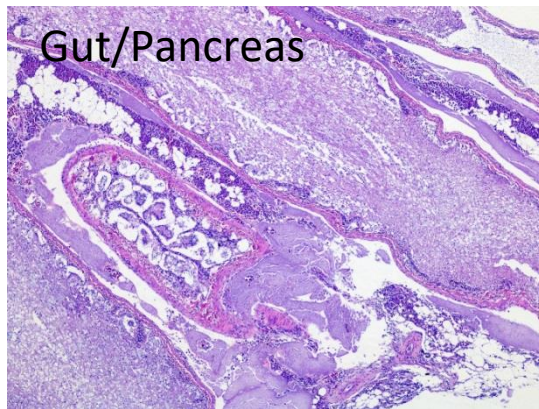
	min	max	Average (N=16)
<b>Nefrocalcinosis</b>	<b>1</b>	<b>5</b>	<b>2,9</b>
<b>“Gill problems”</b>	<b>1</b>	<b>5</b>	<b>2,9</b>
“Wounds”	1	4	2,6
Deformities	1	4	2,6
Vaccine related damages	1	4	2,3
Emaciated fish	1	4	2,3

Score (1-5) on severity of health problems in 16 RAS hatcheries.

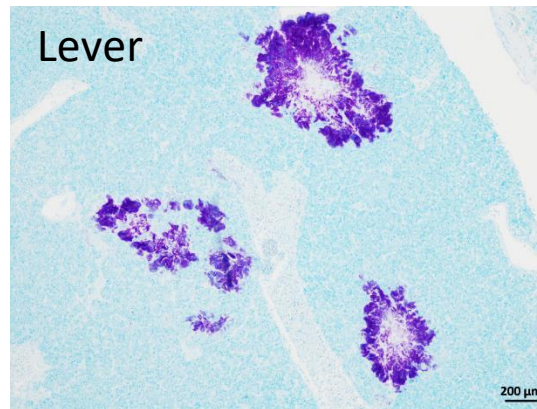


New disease trends?????

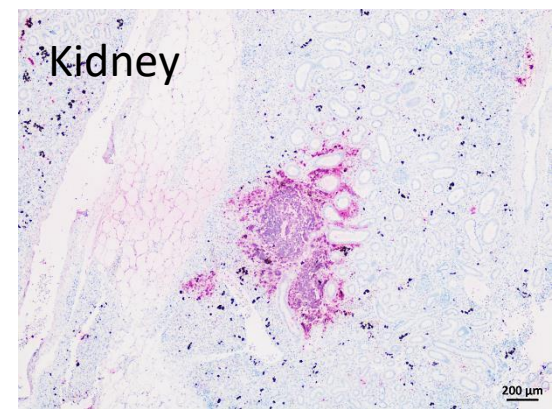
# *Mycobacterium sp*



H&E; Bakterieansamlinger i  
bukhinne rundt tarm



Ziehl Neelsen (ZN)

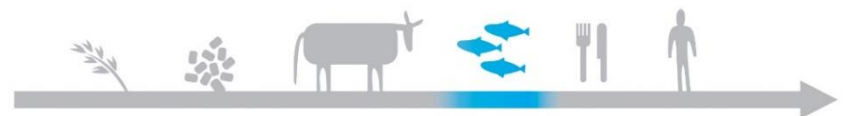


IHK; *Mycobacterium spp.*

Photos: Jinni Gu



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What goes into the system, will stay in the system

It is difficult to clean and disinfect

It is more difficult if the pathogen forms tough biofilm.

Some diseases seem to be more frequent in RAS, but not enough information to conclude

