

IPNV genogroup 6 pathogenicity to rainbow trout, salmon and brown trout

Charlotte Axén

Acting state veterinarian, Fish diseases, Sweden

2022-05-30



Photo: Åke Forssén, Norrfors fish ladder, Ume river

Background

Swedish fish health status with regard to listed diseases (EU) 2018/1882

- The whole territory free from: (A) EHN, (C) VHS, IHN, ISA

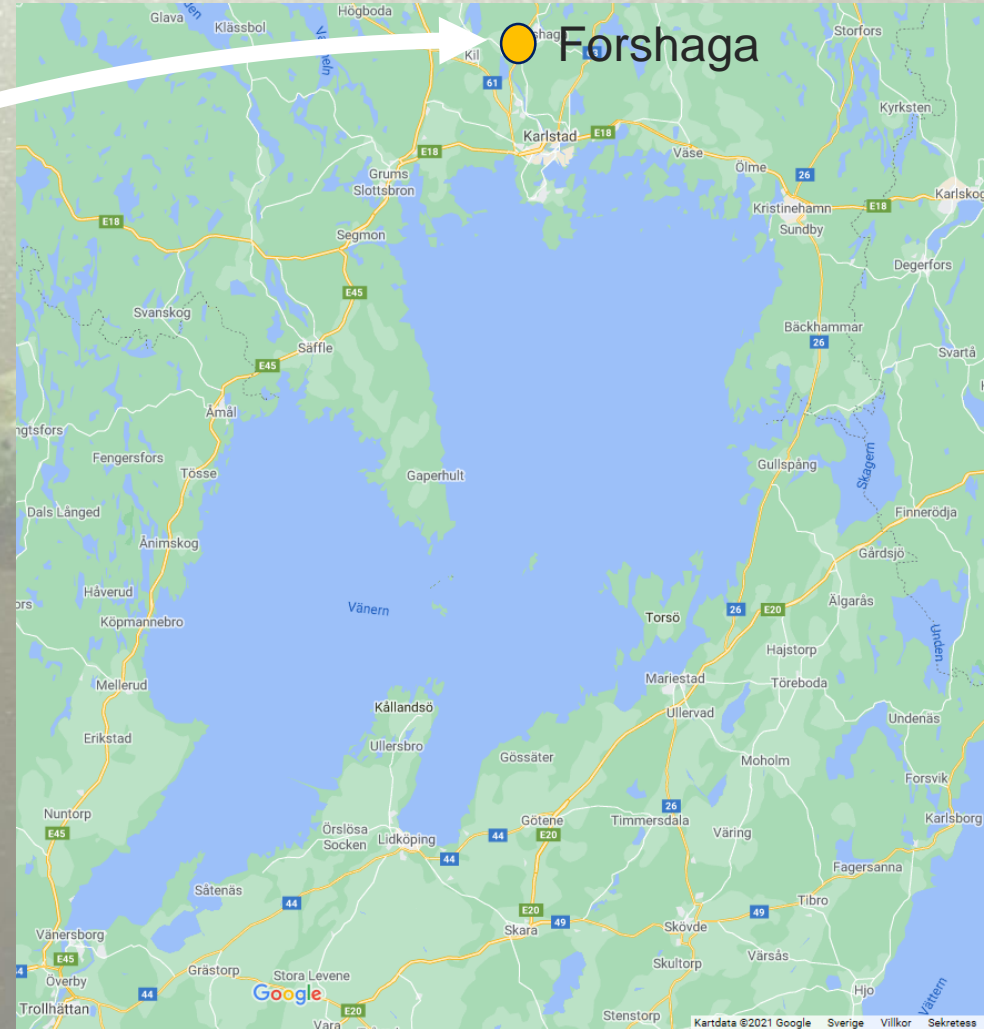
Diseases that are controlled according to (EU) 2016/429, Chapter 4, Article 226 (National measures)

- The whole territory free from: SVC
- The inland zone free from: IPN
- Eradication program in the inland zone for: BKD



Mandatory control of all broodstock females (salmon, sea trout) in order to move fertilized eggs to the inland zone

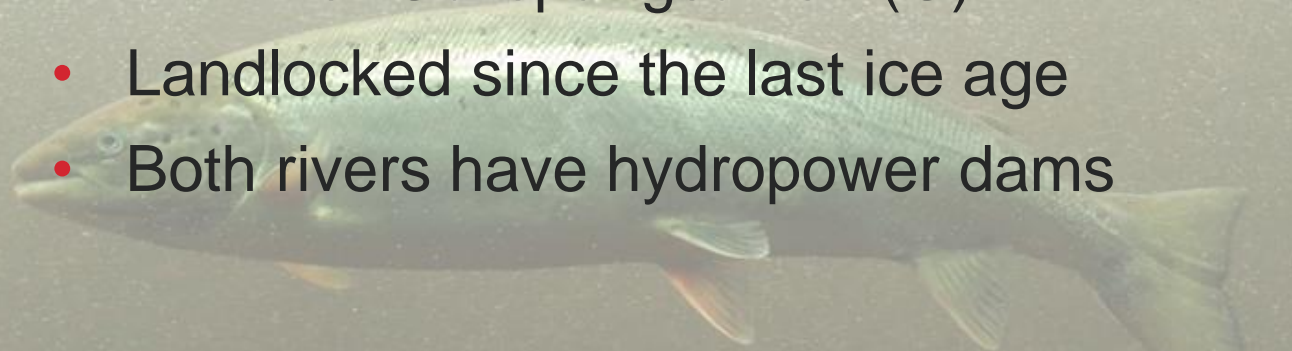
Broodstock farms



Lake Vänern

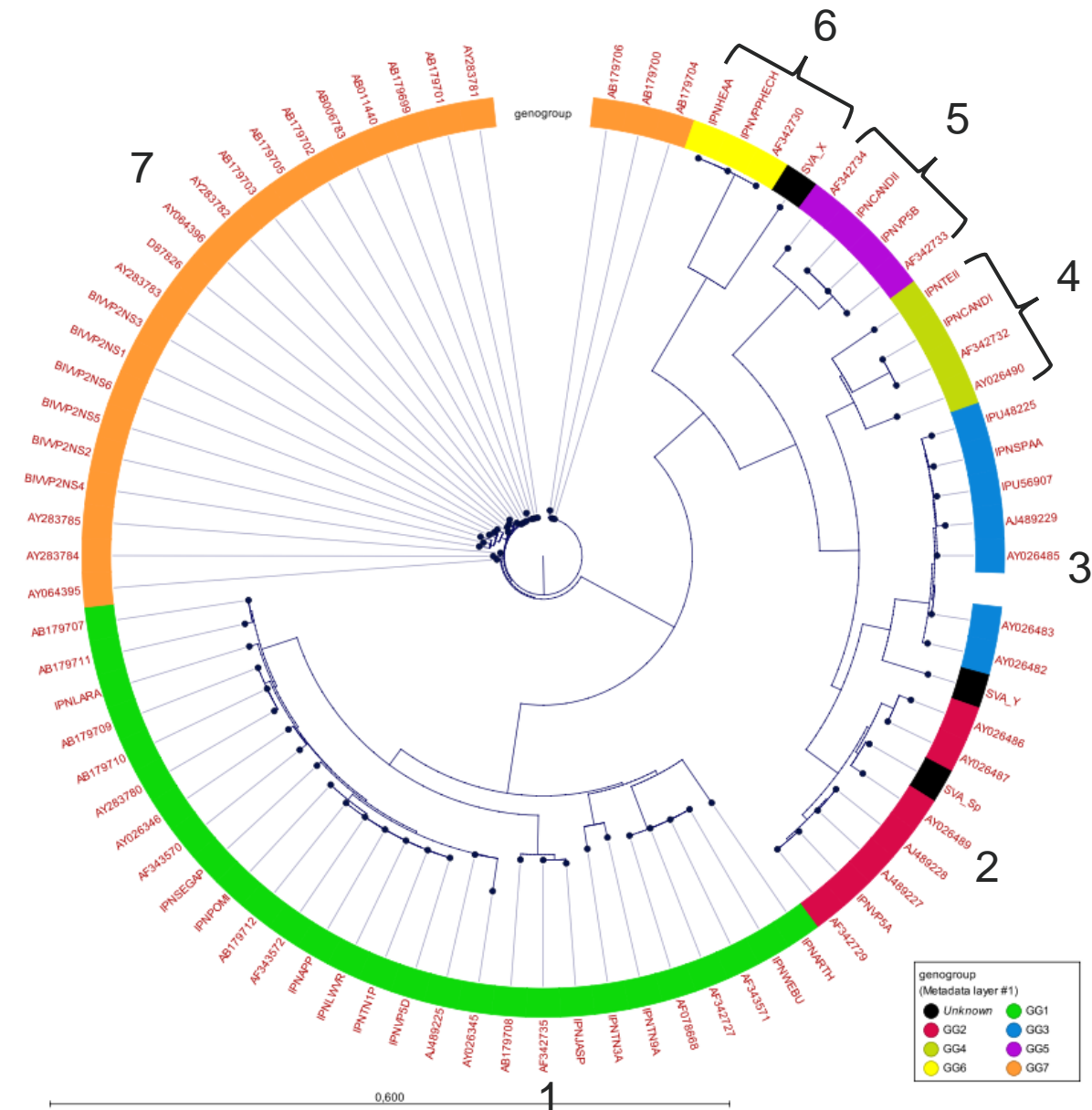


- Two populations of salmon (*Salmo salar*)
- Two populations of (sea) trout (*S. trutta*)
 - River Klarälven (K)
 - River Gullspångsälven (G)
- Landlocked since the last ice age
- Both rivers have hydropower dams



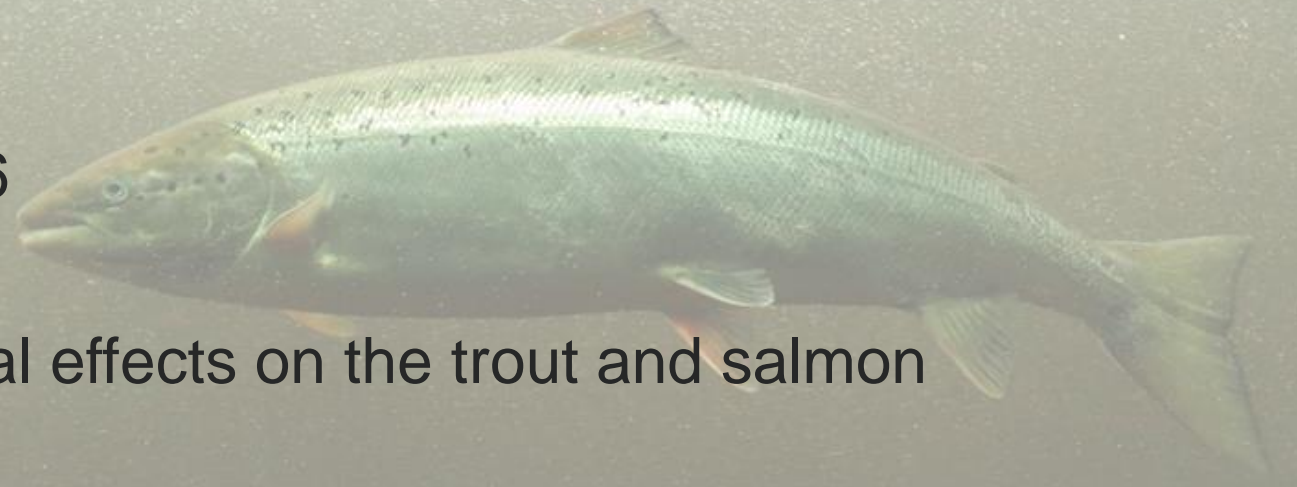
Detection of IPNV genogroup 6 in lake Vänern

- Dec 2016
- one pool (Gullspångsälven trout) IPNV+ (cell culture, followed by ELISA and qPCR)
- Fertilized roe was destroyed
- Sequencing identified genogroup 6



Detection of IPNV genogroup 6

- Dec 2016
 - one pool (Gullspångsälven trout)
IPNV+ (cellculture, followed by
ELISA and qPCR)
 - Fertilized roe was destroyed
 - Sequencing identified genogroup 6
-
- Need for evaluation of potential effects on the trout and salmon populations!
 - First detection in pike, thereafter described from Finland (adult salmonids)
 - NGS has been performed, full RNA sequence present



Step 1: Prevalence estimation

- Preliminary estimate ~5 %
- Collection of additional samples in 2017-2020:

	Salmon	Trout	Salmon or trout
Forshaga	284 / 40	228 / 34	-
Vänern	268 / 42 X / 1	113 / 27 X / 2	7 / 1 X / 2
Klarälven	X / 1	X / 1	
Total	554 – 572 / 84	344 – 371 / 64	9 – 27 / 3
	907 – 970 / 151		

No of fish/ no of pools

All pools negative! = 0.2 – 0.5 % prevalence

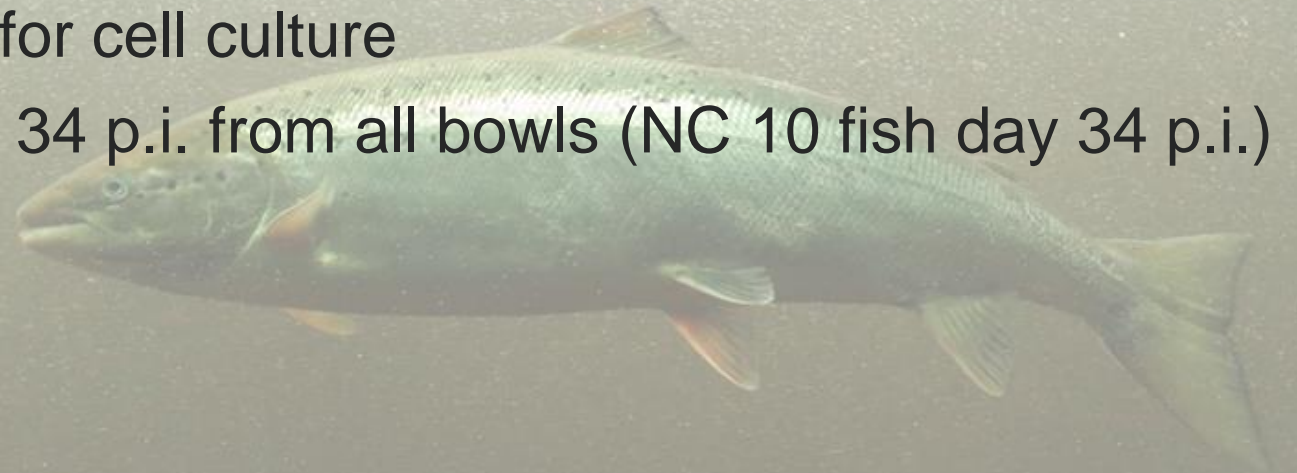
Step 2: Infection trial

- Pretrial in rainbow trout to decide on IPNV genogroup 5 isolate (R) and infection dose
- IPNV gengroup 6 (Swe)
- Negative controls

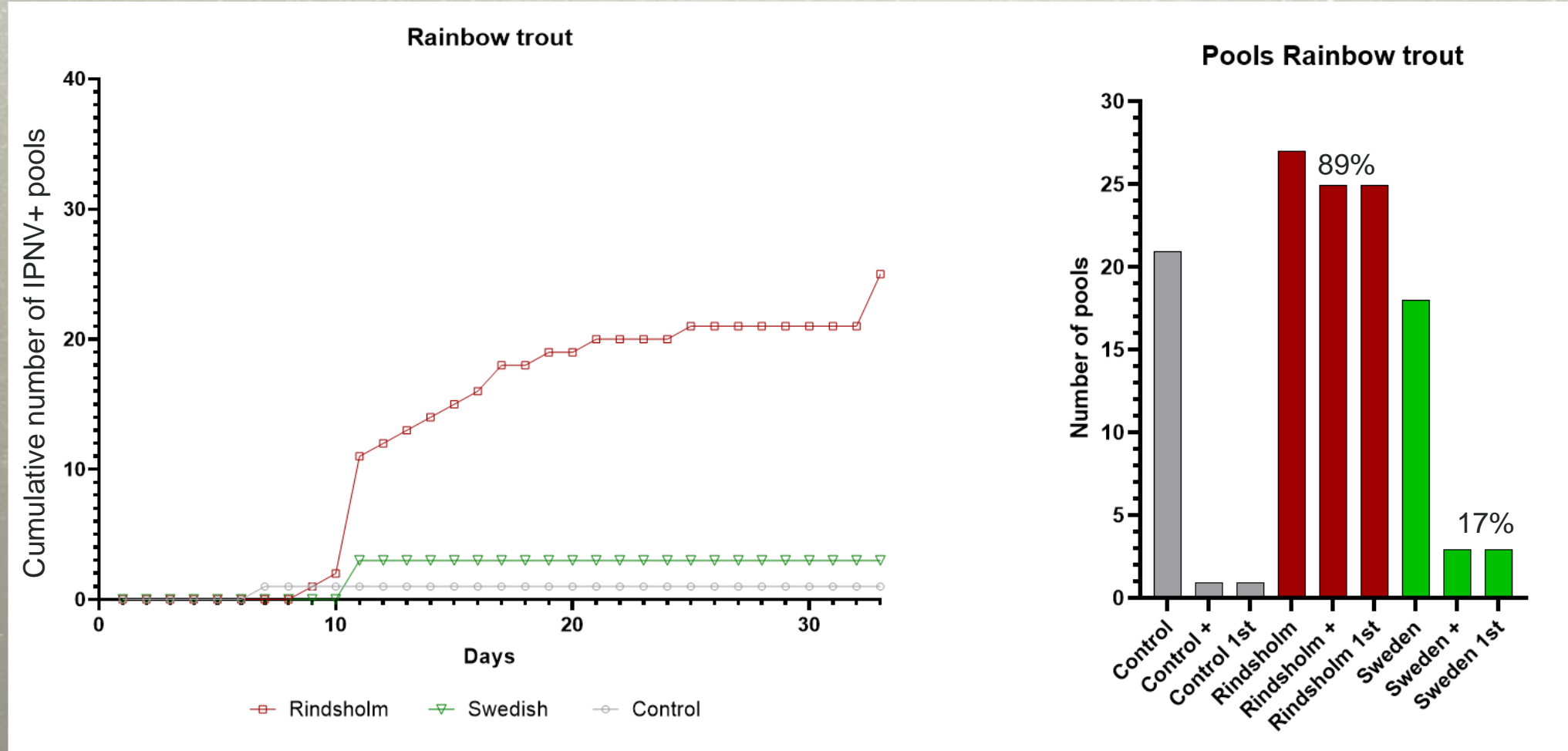
	Negative control		Rindsholm		Swedish IPNV	
Rainbow trout (RT)	NC	NC	R	R	Swe	Swe
Gullspångsälven trout (BT)	NC	NC	R	R	Swe	Swe
Klarälven salmon (AS)	NC	NC	R	R	Swe	Swe

Challenge

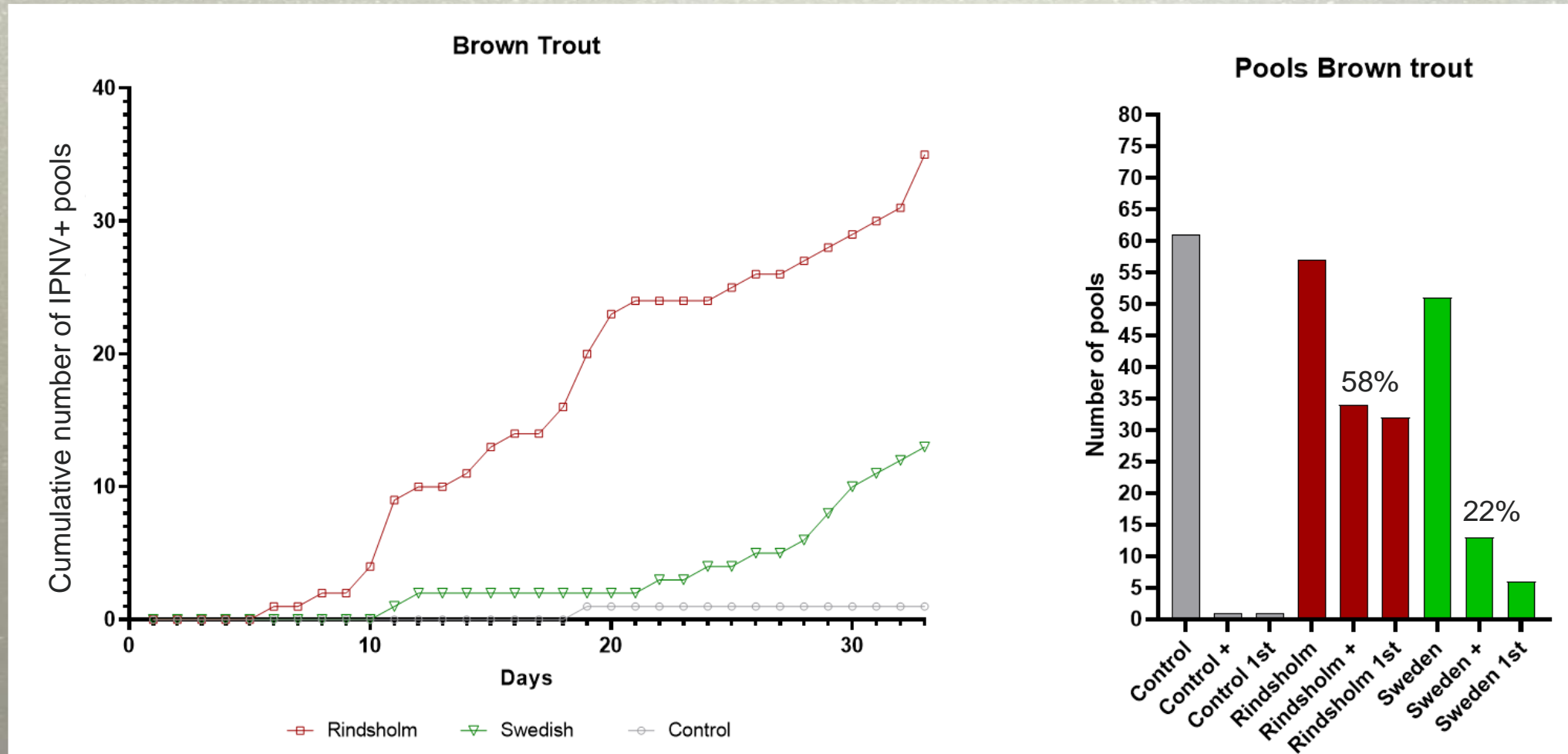
- Challenge at start feeding
- Immersion bath 1.3×10^8 virus particles (2.6×10^5 TCID₅₀/ml water), 6 h
- Monitoring for 34 days p.i.
- Dead/moribund fish sampled for cell culture
- Five fish sampled day 12 and 34 p.i. from all bowls (NC 10 fish day 34 p.i.)



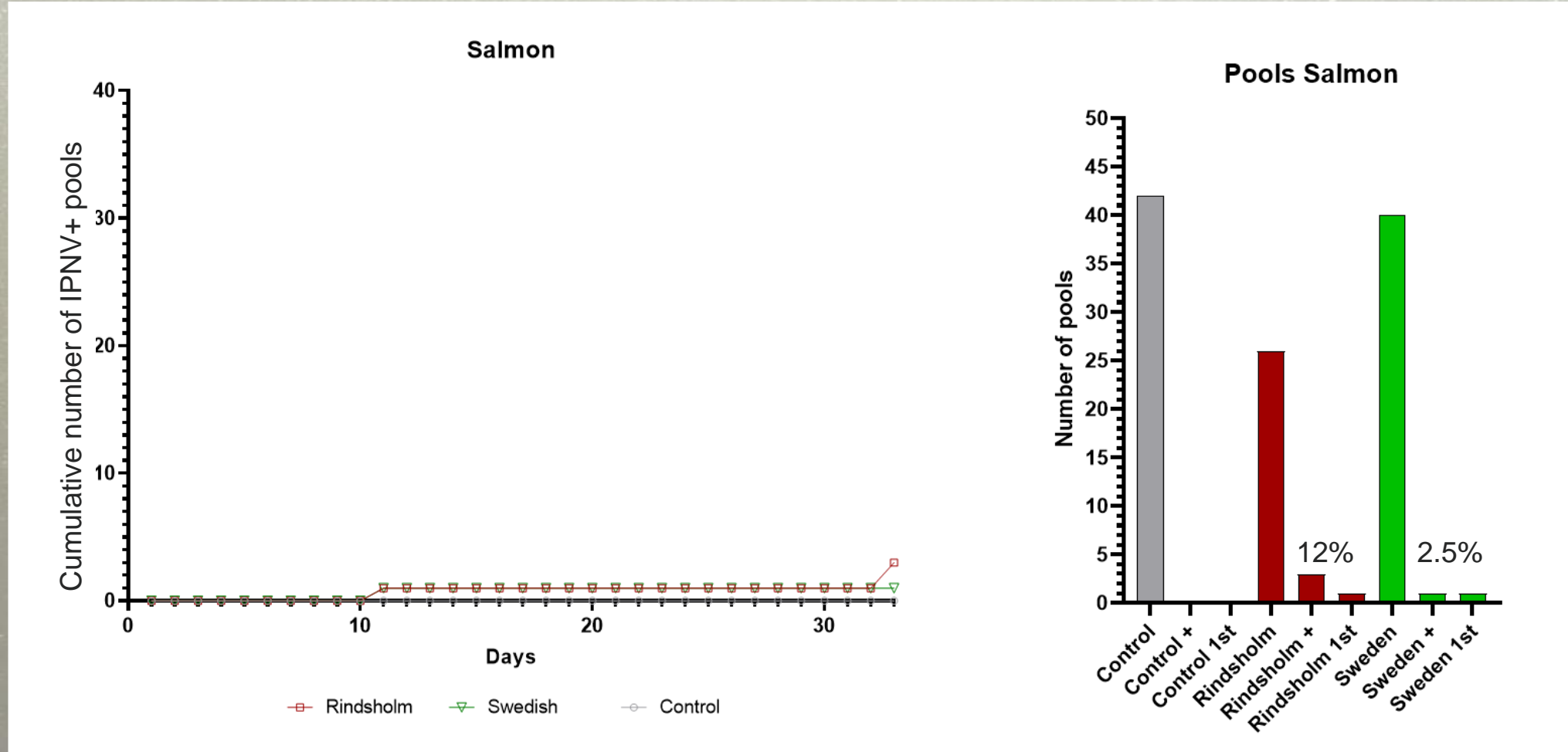
Results: Rainbow trout



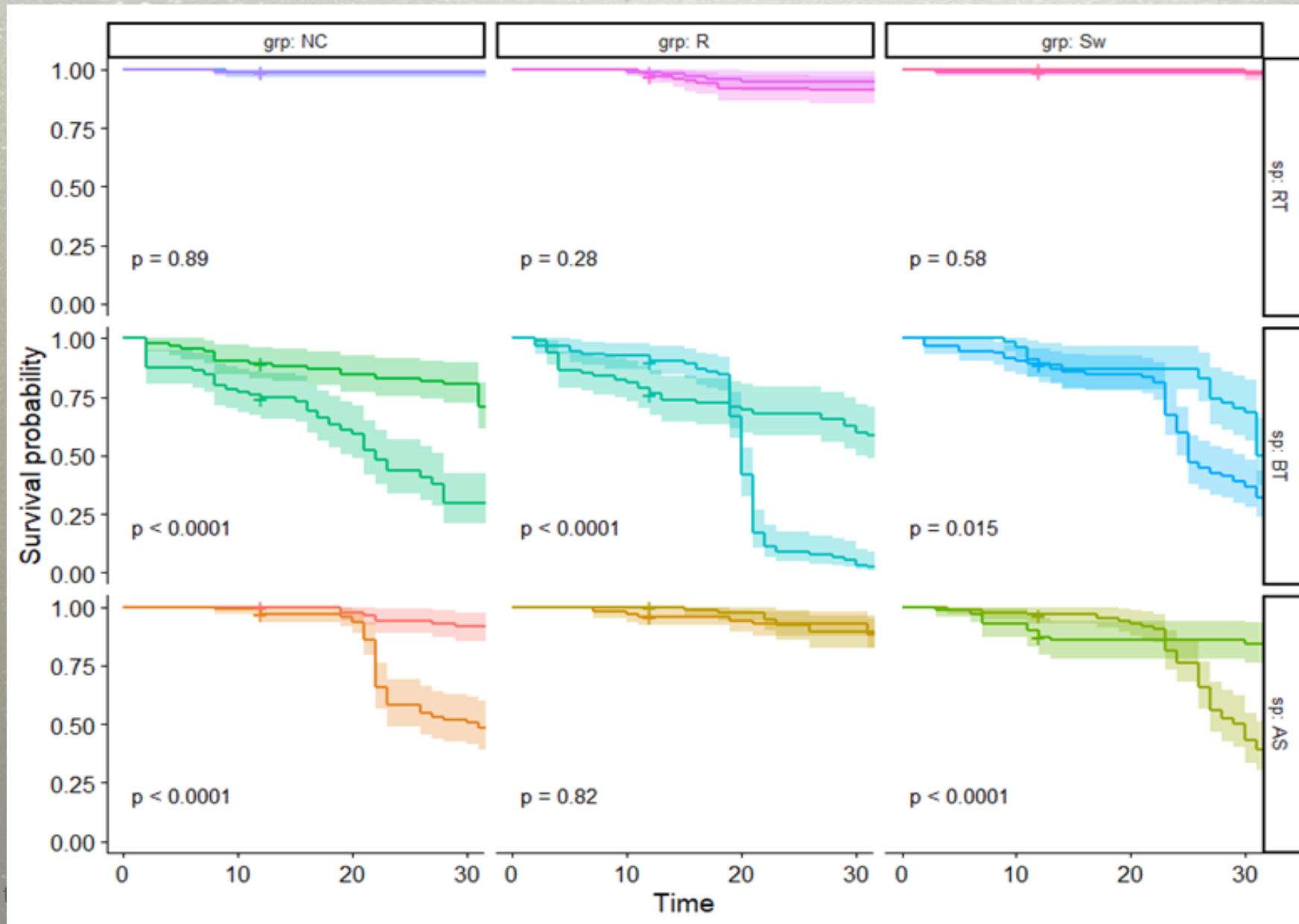
Results: Gullspångsälven trout



Results: Klarälven salmon



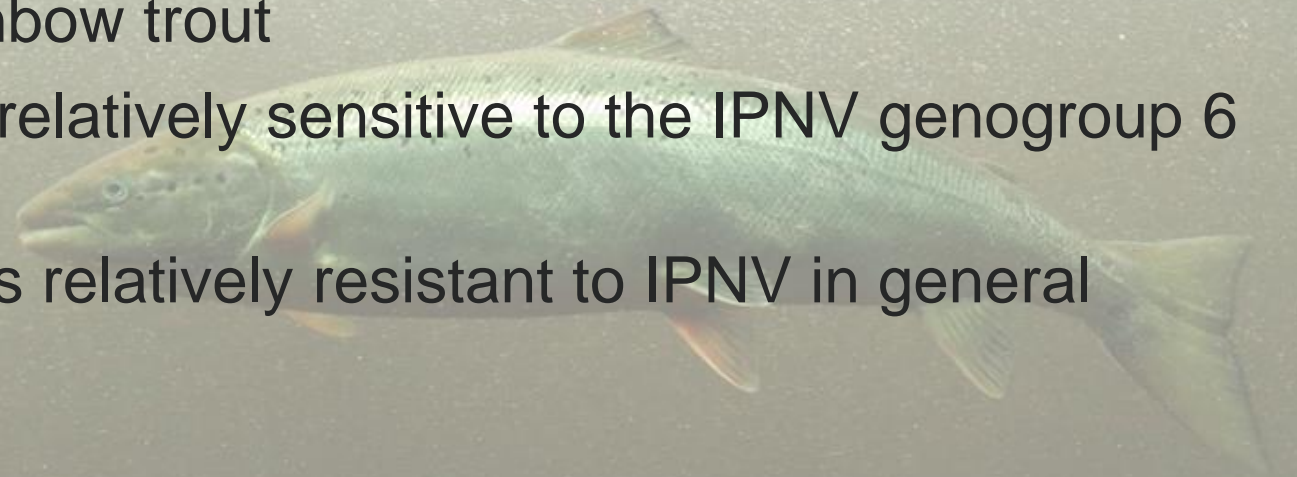
Results: Survival



CONCLUSIONS

- IPNV genogroup 5 much more pathogenic than IPNV genogroup 6
 - Caused a higher infection rate
 - More samples + 1 week post inoculation on cell culture
 - Higher mortality in the rainbow trout
- The Gullspångsälven trout is relatively sensitive to the IPNV genogroup 6 isolate
- The Klarälven salmon strain is relatively resistant to IPNV in general

- The IPNV genogroup 6 isolate pose a minor to negligible risk to the wild salmonids in lake Vänern
- The prevalence in lake Vänern salmonids is very low



Thanks to



for funding the infection trial



Thanks to all the DTU personnel who helped during the trial

And thanks for listening!

Contact: charlotte.axen@sva.se

Manuscript in preparation, authors:

From DTU: Jacob Schmidt, Niels-Jørgen Olesen

From SVA: David Persson, Arianna Comin, Mikhayil Hakhverdyan, Mikael Leijon, Charlotte Axén