

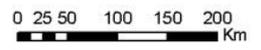
PAST EXPERIENCE AND FUTURE PLANS FOR THE CONTROL AND MANAGEMENT OF VHS-IHN IN THE TRENTO REGION ITALY

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Trento Province



History

Thanks to its hydrogeological conformation, the Trento Region is particularly favorable for trout farming.

Fish farming in this region started between 1873-79 due to the initiative of Father Francesco Canevari, Agostino Zecchini e Filippo Count Bossi Fedrigotti.

In 1885 they introduced in the region and for the first time the rainbow trout (*O. mykiss*) and the brook trout (*S. fontinalis*) from the Alsatian.

The first commercial trout farm in Trento Region dates 1902 in Giustino, Alta Val Rendena.



Today

38 ha of water ponds

Farmed species:

- *rainbow trout*
- *brown trout*
- *marble trout*
- *brook trout*
- *arctic char*



Farms:

FISH FARMS

N° 54

HATCHERIES

N° 14

PUT AND TAKE FISHERIES

N° 18

TRANSFORMATION PLANS

N° 5

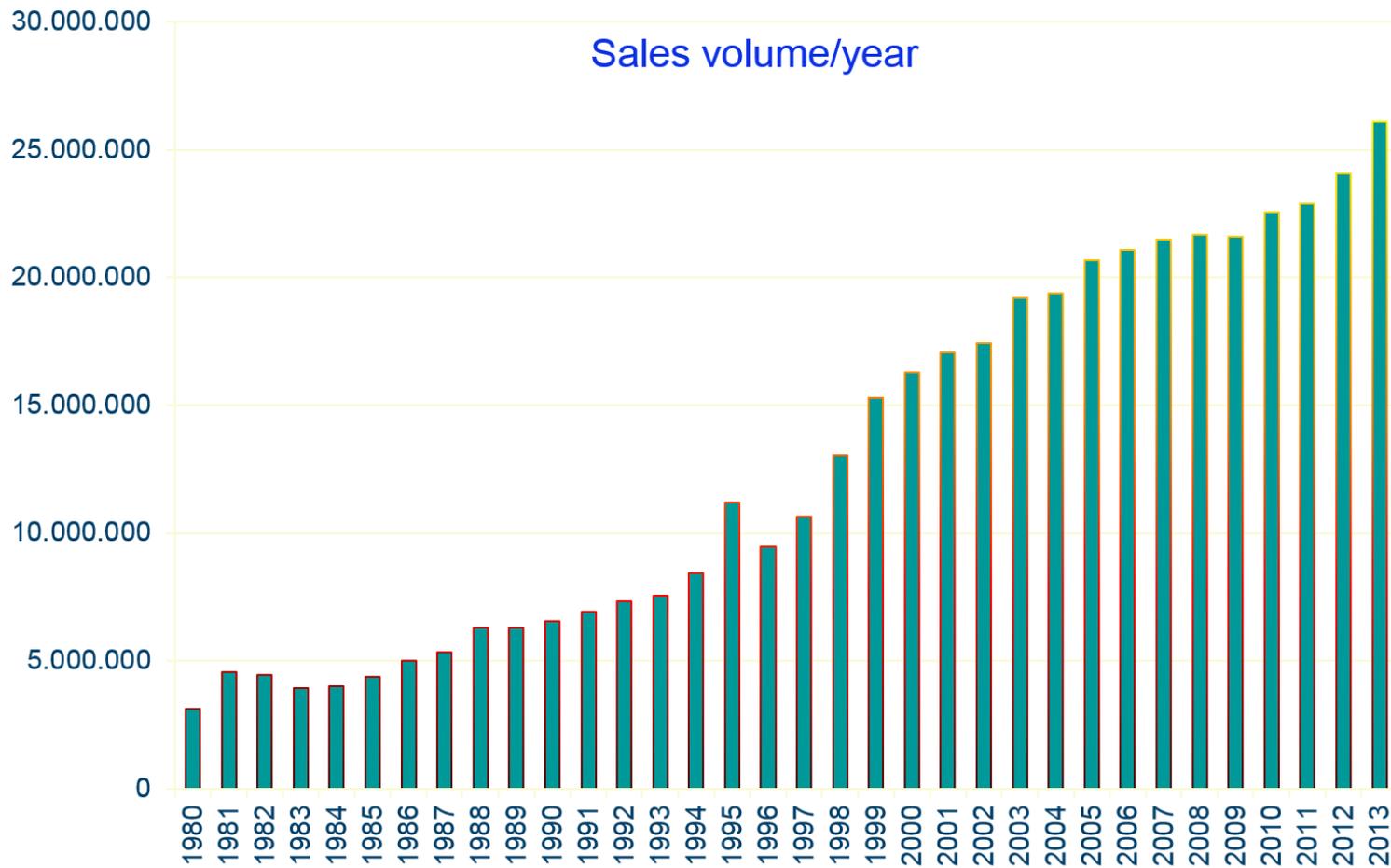
(according to Reg. 853/2004)

Production

– Fish for consumption	Kg. 5.183.000
– Eggs for consumption	Kg. 1.900.000
– Rainbow trout eggs	n. 230.000.000
– Brown trout eggs	n. 45.500.000
– Fingerlings	n. 34.450.000

→ Employed personnel : 450 people

Total gross production
€ 26.113.200



History

- In the **late '70s** the VHS eradication program started as a voluntary campaign;
- In **1978** a new viral disease appeared: the IHN;
- In **1990** the VHS and IHN eradication programs became compulsory in the region;
- In **1992** the eradication programs were put in line with the European legislation (91/67/CE) and in 1996 several farms and areas were declared free from VHS-IHN on an historical base, thanks to the previously performed surveillance programs.
- In **2008** the eradication campaigns were further implemented following the EU Council Directive 2006/88/EC.

Sanitary situation

- After almost 40 years of surveillance, nowadays the region counts
- **15 category I zones (out of 20)**
- 45 category I farms (out of 68)
- 4 category II farms
- 7 category III farms
- 12 category V farms



Recent surveillance activities

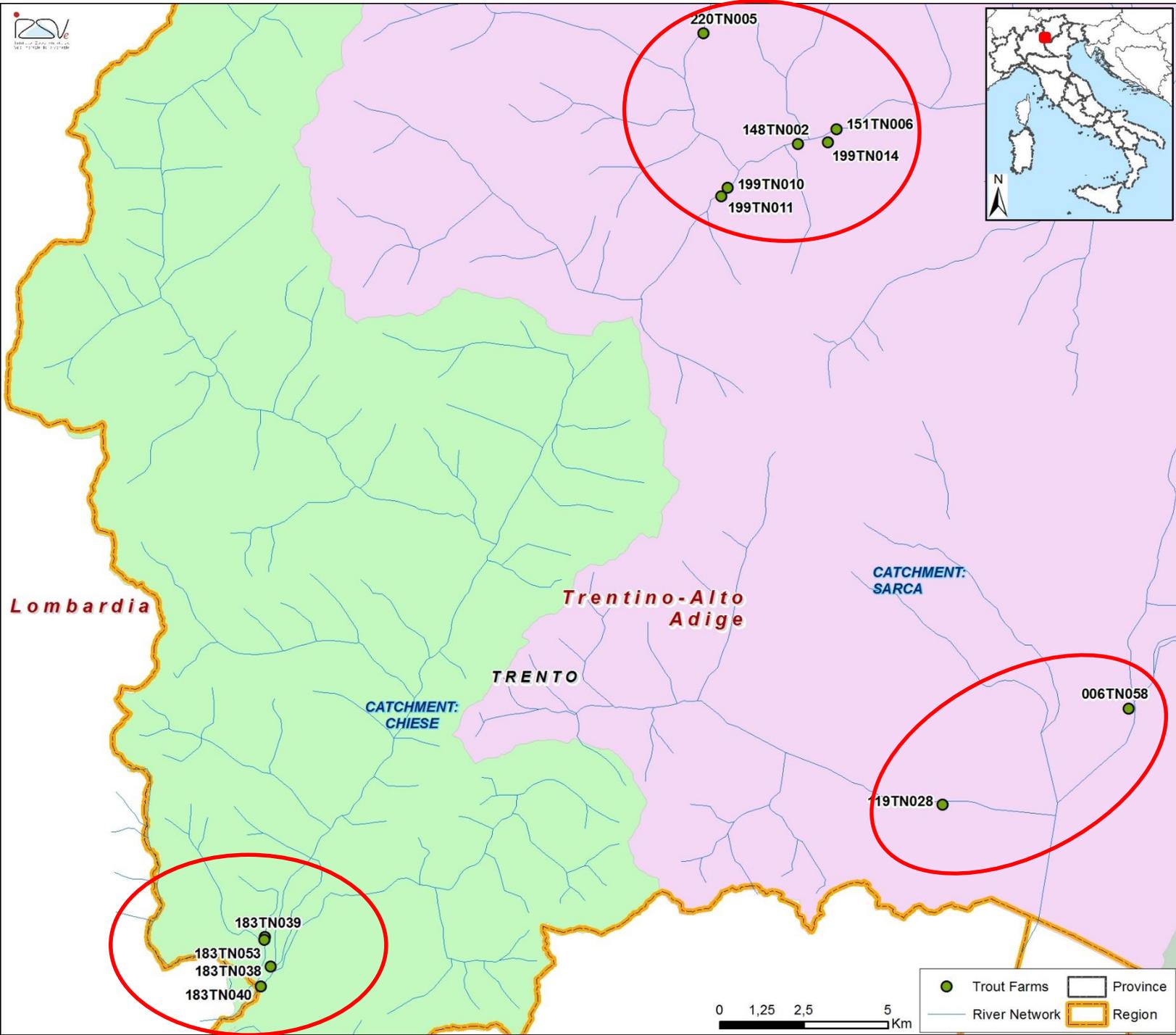
Council Directive 2006/88/EC requires category V farms to be subjected to minimum control measures and passive surveillance only;

A regional resolution (Reg. delib.n.740 del 19/5/2014) stated that also category III and V farms were to be subjected to annual monitoring processes.

In February and March of 2015 (water temperature ranging from 3 to 9°C) **all 12 infected farms** were visited and sampled.

A total of **161 pools of organs** and **357 sera** were collected and analyzed by:

- Virus isolation and subsequent virus identification by IF
- Real time RT-PCR
- Sequencing and phylogenetic analysis
- 50% plaque serumneutralization test



Results/1

n°	ID	VHS	INH	HISTORY	VHS VI	IHN VI	VHS PCR	IHN PCR	VHS SN	IHN SN
1	220TN005	2010	2013	1990 IHN	2/15	0/15	3/15	0/15	5/30	4/30
2	199TN011	2011	2001	1997 IHN	3/15	0/15	5/15	0/15	8/28	21/28
3	199TN010	2012	2001	1985 VHS	5/15	4/15	11/15	1/15	6/30	9/30
4	119TN028	/	2011	2011 IHN	0/12	0/12	0/12	0/12	8/30	3/30
5	183TN040	2012	2012	1990 IHN	3/10	4/10	4/10	5/10	8/30	15/30
6	006TN058	1999	1993	1985 VHS	1/10	7/10	4/10	7/10	9/30	8/30
7	151TN006	2003	1998	1992 VHS	0/9	0/9	0/9	0/9	9/30	10/30
8	199TN014	2011	1997	1994 VHS	7/11	3/11	6/11	2/11	9/30	11/30
9	148TN002	2011	2000	1991 VHS+IHN	3/11	9/11	4/11	6/11	14/30	11/30
10	183TN053	2011	2001	1998 VHS	1/4	0/4	1/4	0/4	4/30	7/30
11	183TN038	2011	2000	1996 VHS	0/15	8/15	1/15	11/15	8/30	11/30
12	183TN039	2011	2001	1996 VHS	0/10	2/10	0/10	5/10	6/29	3/29
				TOTAL	25/137	37/137	39/137	37/137	94/357	113/357
				%	18,2	27,0	28,5	27,0	26,3	31,7

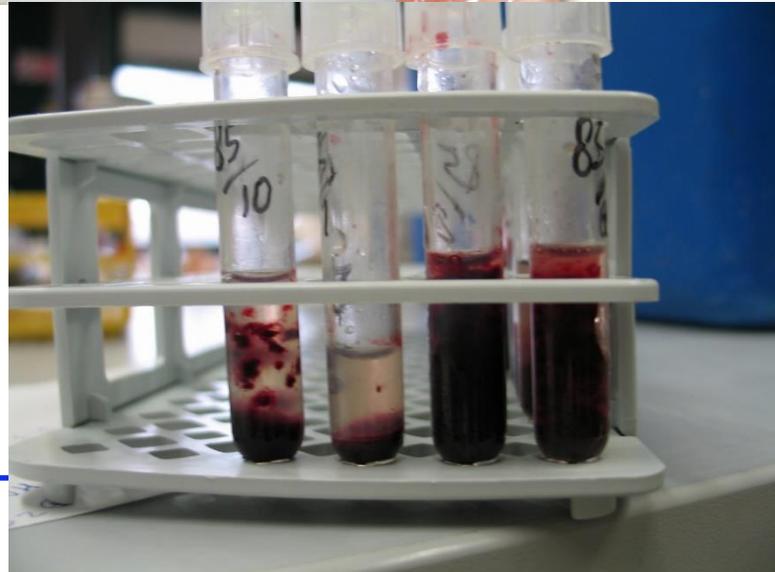
Results/2

- A **relatively low prevalence of the VHS** (18,5%) was found, also in targeted sampling of symptomatic fish.
- Average of VHS prevalence based on antibodies detection was 26%, ranging between 13% and 47%.

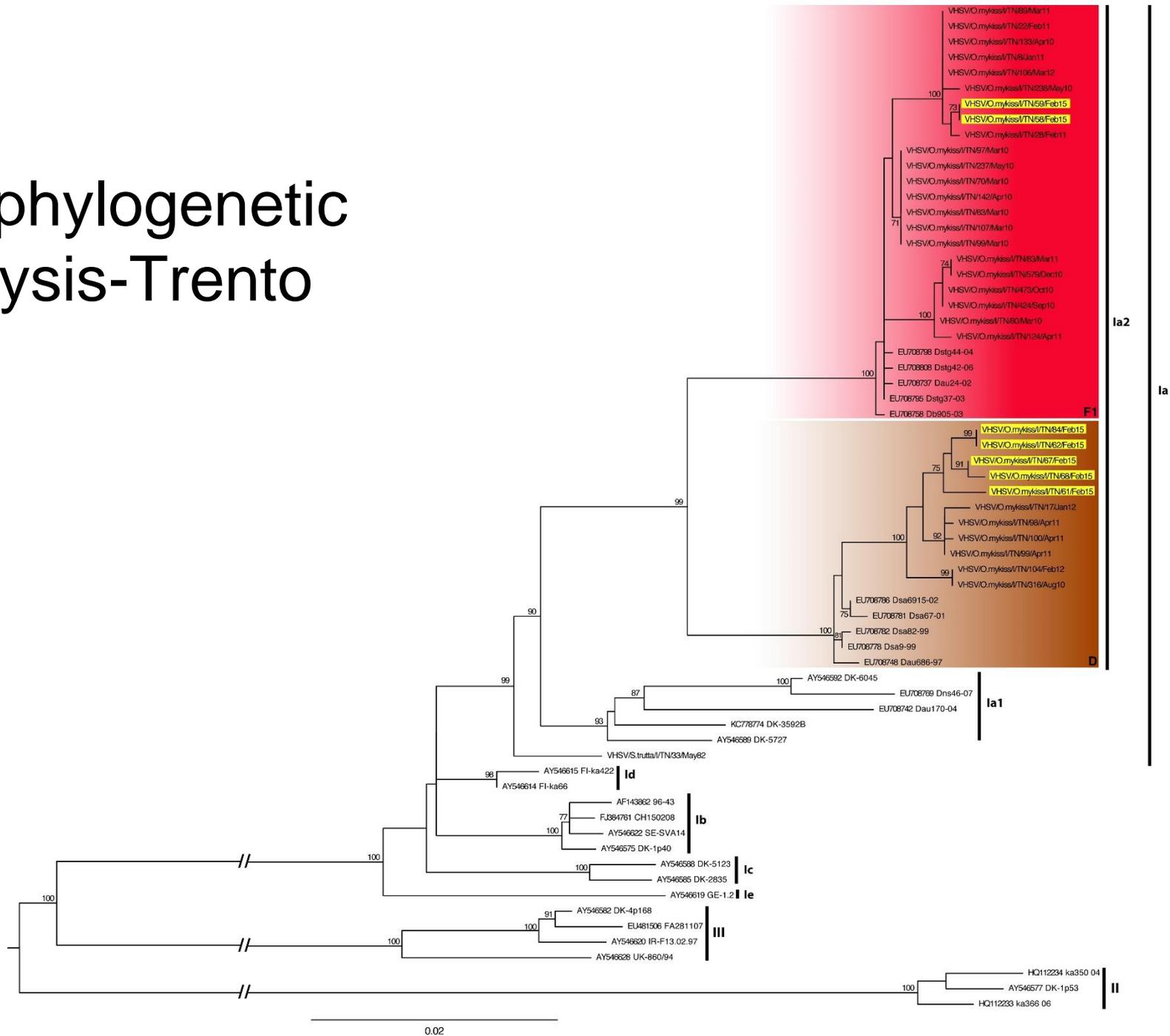
- An **unexpected high IHN prevalence** was found (27%).
- Average of IHN prevalence based on antibodies detection was 31%, ranging between 17% and 55%.

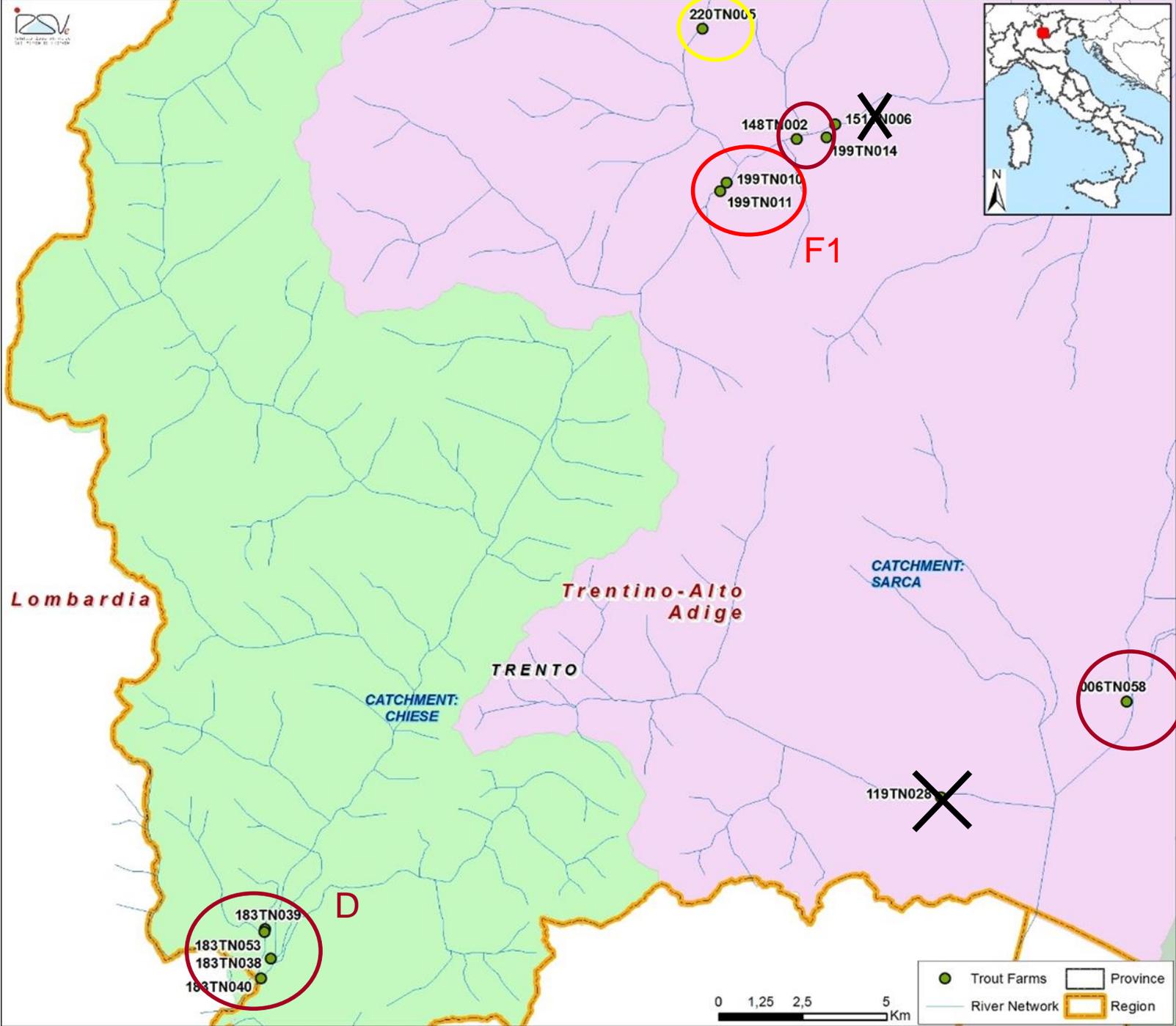
- All farms tested positive for the presence of antibodies against both diseases

Does a so called “highly virulent” IHN strain exist?

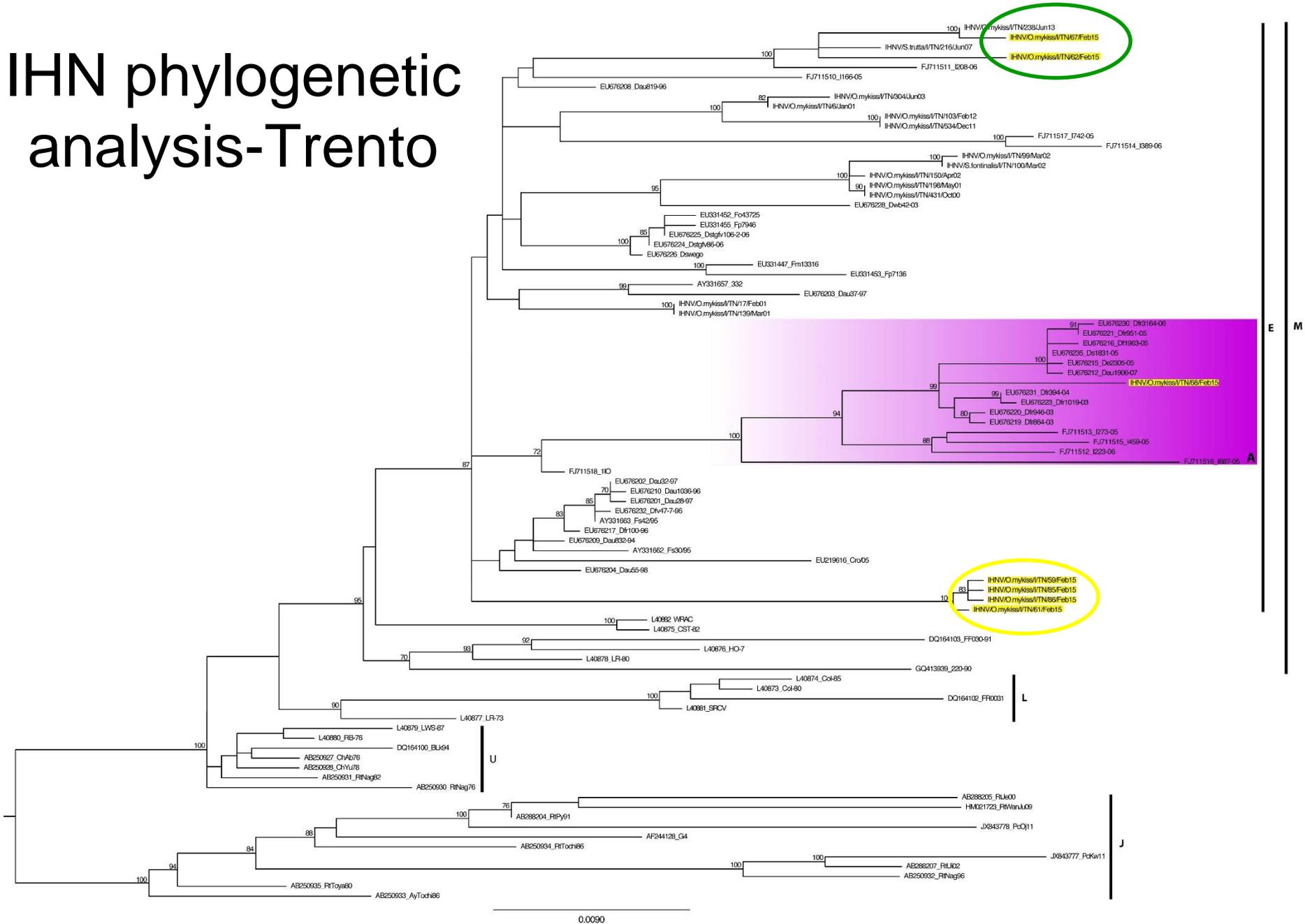


VHS phylogenetic analysis-Trento





IHN phylogenetic analysis-Trento





Conclusions from the surveillance activities

- Difficulties in tracing viruses in category V farms due to far samplings.
- Frequent viral (VHS and IHN) exchanges amongst infected farms of the same region.
- Different transmission dynamics and lack of genetic information for the IHN virus.
- Unexpected high prevalence of genetically different IHNv and detection of “highly virulent” IHN strains.
- Importance of serological surveillance to increase viral detection rate, despite the relatively low antibodies prevalence detected.

New options for the control of viral disease

- Sector-based eradication
- Vaccination



Sector-based eradication: rationale

Reg. delib.n.740 del 19/5/2014, by way of derogation from 2006/88/EC, due to economic or practical reason, a sector-based eradication plan may be authorized if:

- Physical division of the farm in sectors with autonomous water inlet is available 
- Partial and subsequent emptying of the sectors from upstream to downstream can be performed
- An activity plan to the competent authority is presented
- Periodical inspections, sampling and laboratory analysis are performed

Classical eradication

Advantages

- Long-standing experience from the past
- Good % of success
- Limited time period of activity

Disadvantages

- High costs for initial investments (disinfectants, personnel, loss of production)
- Long period without production (8-12 months depending on the size of the farm)
- High risk of re-infection with high % of mortality in new introduced cat. I fish if disinfection was not efficacious
- Frustration of operators in case of failure
- Fish welfare?

Sector-based eradication

Advantages

- Long term approach with no interruption of production
- Low costs for disinfections and personnel
- Education of the farmers and collaborators on the importance of biosecurity
- If fish get re-infected, possibility to start again several times with minimum money investment

Disadvantages

- No experience from the past
- % of success ?
- High costs on a long period base (for maintenance of biosecurity)
- High risk of re-infection

Vaccination/1

- The availability of an efficacious vaccine will be of help to get rid of the disease in **endemic regions**
- The vaccine would be used only after eradication to make fish more resistant to possible viral residues
- Vaccination would be combined to strict virological surveillance
- A **bivalent vaccine** should be available because the majority of fish farms are co-infected
- The best vaccine appears to be the **DNA technology**
- But....

Vaccination/2

... the DNA vaccine presents several constrains :

- Long-term **safety issues** remain to be assessed
- The Official distinction between DNA-vaccinated animals and genetically modified organism (GMO) is not always clear
- **Public aversion** to ingredients from GMOs in food products, which might influence the consumers' acceptance of veterinary DNA vaccines
- No regulatory precedents yet available for DNA vaccines for husbandry animals

Vaccination/3

- We found at least 1 authorized pharmaceutical company interested in producing a DNA vaccine.
- We are planning to produce small batches of vaccine in order to perform a small vaccination trial in selected infected farms to verify its the efficacy.
- Which strains?
- We need to ask the authorization to the Italian Ministry of Health

- Despite the many constraints, we have to push politics and also common people towards the use of vaccine if we want to reduce the prevalence of trout viral diseases in endemic areas

Many thanks to:

Miriam Abbadi (sequencing),

Marica Toson (statistics),

Alessandra Buratin (serology),

Andrea Fortin-Elisa Mazzacan-Giulia Trovò (PCR),

Francesco Pascoli (biologist),

Claudia Casarotto (GIS unit),

Giuseppe Arcangeli (head of the NRL),

Piacini Alba & Gatti Franco (local vets).

....and you for your attention!

Come and visit Trentino !

Castel Toblino



Rocca di Arco