

Results from Swedish Health Monitoring of the Baltic Salmon Population

Ulf-Peter Wichardt

Fish Health Control Programme

Älvkarleby, Sweden

Fish Health Control Programme

- Monitoring and control programmes according to EC regulation 91/67
- Preventive measurements for other diseases
- Welfare programmes for farmed fish
- Advising and diagnostic service to the fish farms
- Information and training to the farmers

Acknowledgment

This monitoring programme was started by Swedish Salmon Research Institute, which now has ceased operation.

Data from 1986 - 1989 has been derived from this source.

Short characteristics of the Baltic salmon

The population of salmon in the Baltic belongs to the Atlantic salmon species, *Salmo salar*, however it is genetically isolated from the population living in the Atlantic, being confined to the Baltic drainage area

Östersjöns laxälvar

Fet stil = vildlaxälv, normal stil = älv med odlat bestånd, understruket = potentiell laxälv



River names with a slash (/) show main river/tributary. River names with hyphen (-) show names in different countries.

Swedish Compensatory Programme for Salmon

- 8 rivers / 8 separate strains are used for Baltic salmon
- 2 rivers / 2 separate strains are used for Atlantic salmon
- 1 river/ 1 strain is land-locked salmon in fresh water (Lake Vänern)
- In total 2 000 000 smolts annually
- Mainly salmon (90 %) but also brown (sea-) trout



Short characteristics of the (farmed) Baltic salmon

- normal 2 year until smolt and released (May) in the Baltic (approx. 100 gram)
- 2 - 3 % are tagged (65 000 – 70 000 fishes)
- all strains migrate to the Baltic main basin for feeding; stays normal 3-4 (5) year



Short characteristics of the (farmed) Baltic salmon, cont.

- they start their migration for spawning in the beginning of the summer
- normal stripping period is October-November (to 10-15 kg)

Farming of the Baltic Salmon

- All of the rivers has facility for catching and keeping adult fish from July - October
- All hatcheries/smolt-stations are located down streams in the rivers, first dam
- Brood fishes are kept in separate sites apart from hatchery/smolt-station
- Disease prevention has always been of high priority and concern

Farming of the Baltic Salmon , cont.

- The brood fish are individually tagged before artificially stripping
- All females used for stripping are sampled
- The eggs kept in a 'quarantine'-like hatchery until eyed-eggs
- Strict hygienic measurement are in place until the diagnostics results are reported

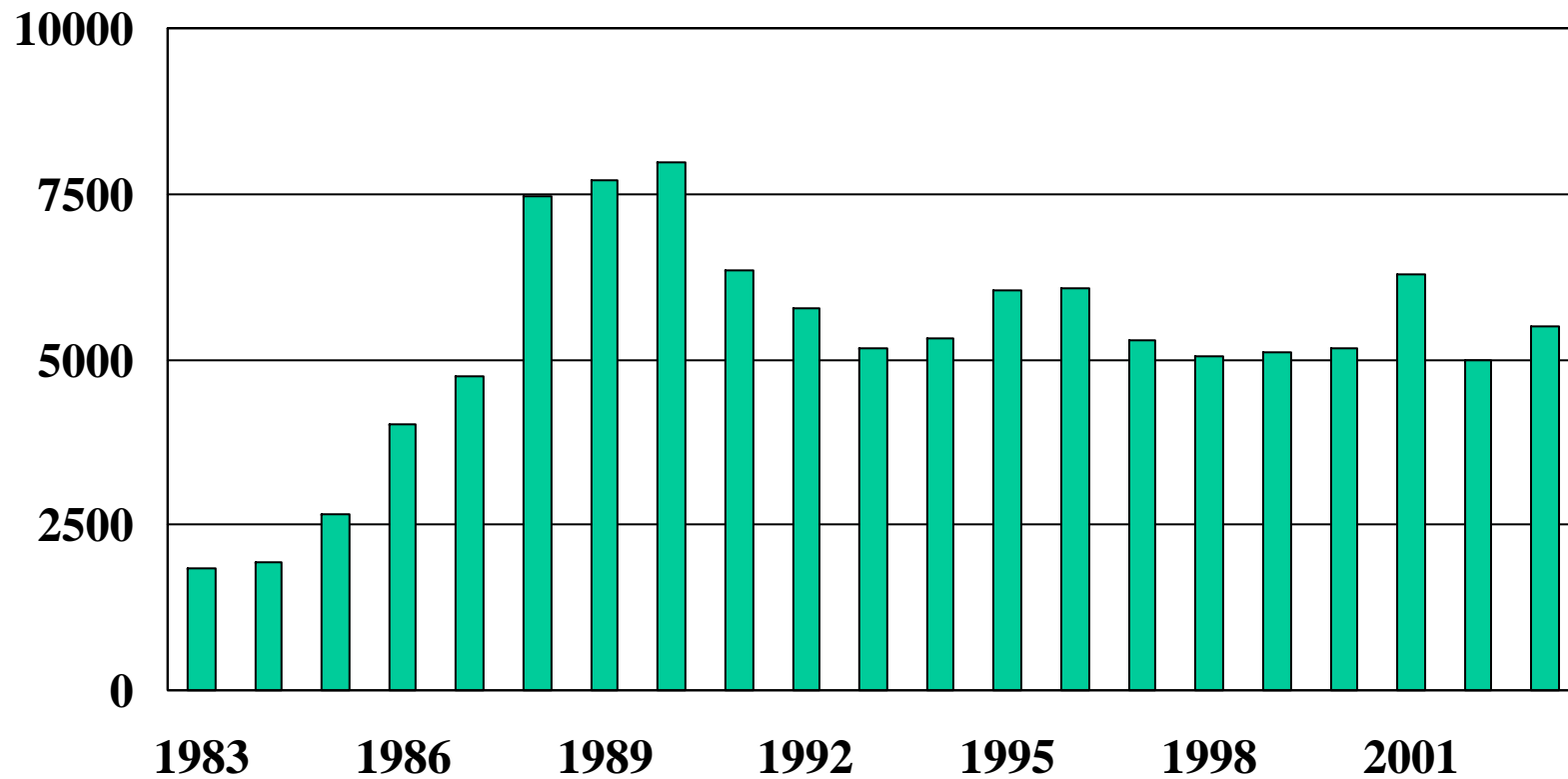
Control Programme for Feral Brood Fish

Primary reason for starting the programme
1986 was the risk for disease interaction
with farmed fish and mainly vertical
transmitted diseases, *ie.* BKD and IPN-V.
All females used for stripping are sampled.

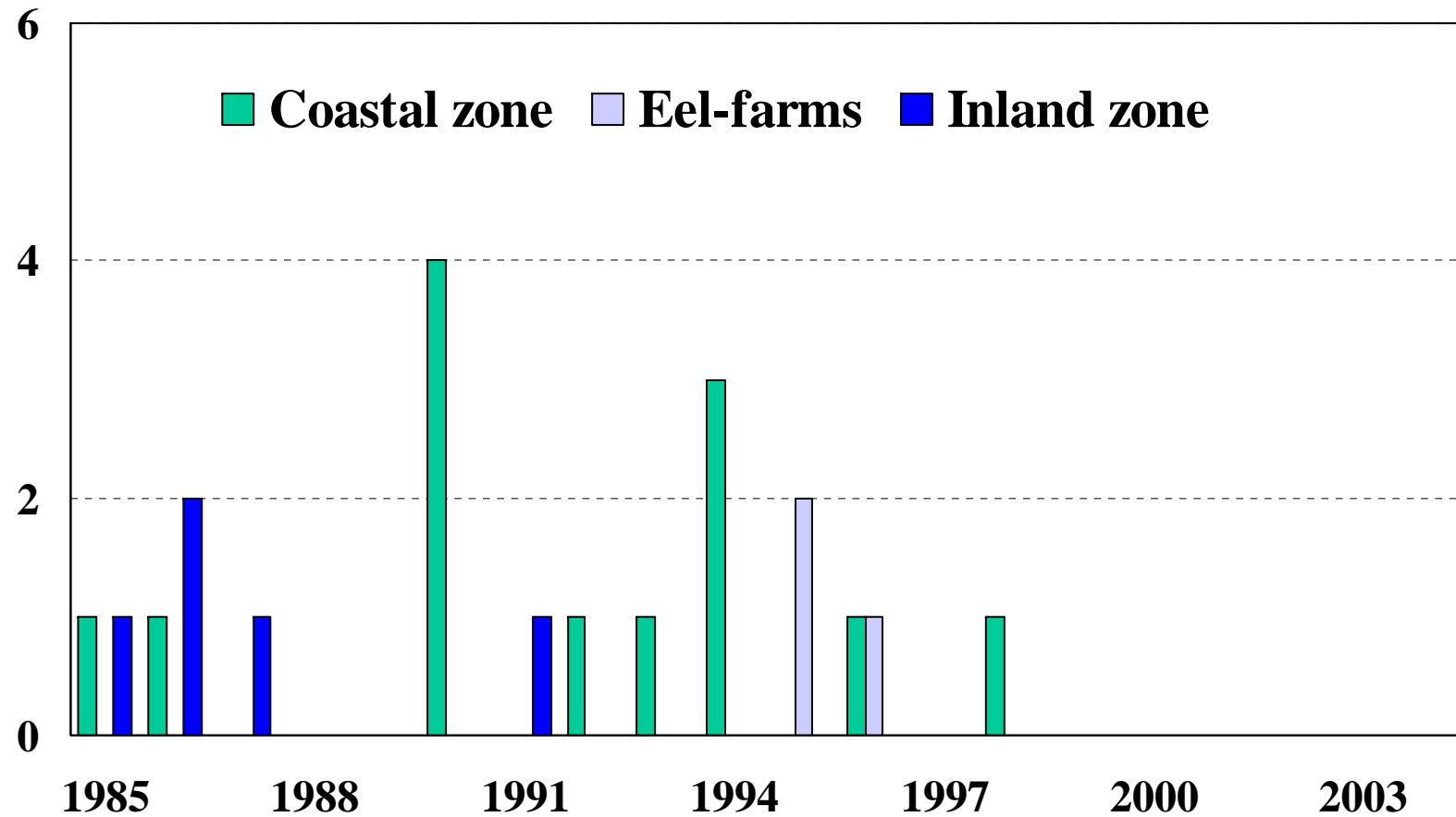
Fish farming in Sweden

- *Rainbow trout* and *Arctic char* for consumption purposes (8 000 metric tonnes); inland and coastal zone, historical (-1994) also farming of Baltic salmon
- *Rainbow trout*, *Brown trout* and *Arctic char* for recreational fishing purposes (2 000 metric tonnes); only inland zone
- *Eel* for consumption purposes (250 metric tonnes); closed systems
- *Salmon* and *Brown trout* (sea trout) for restocking purposes (compensatory programmes)

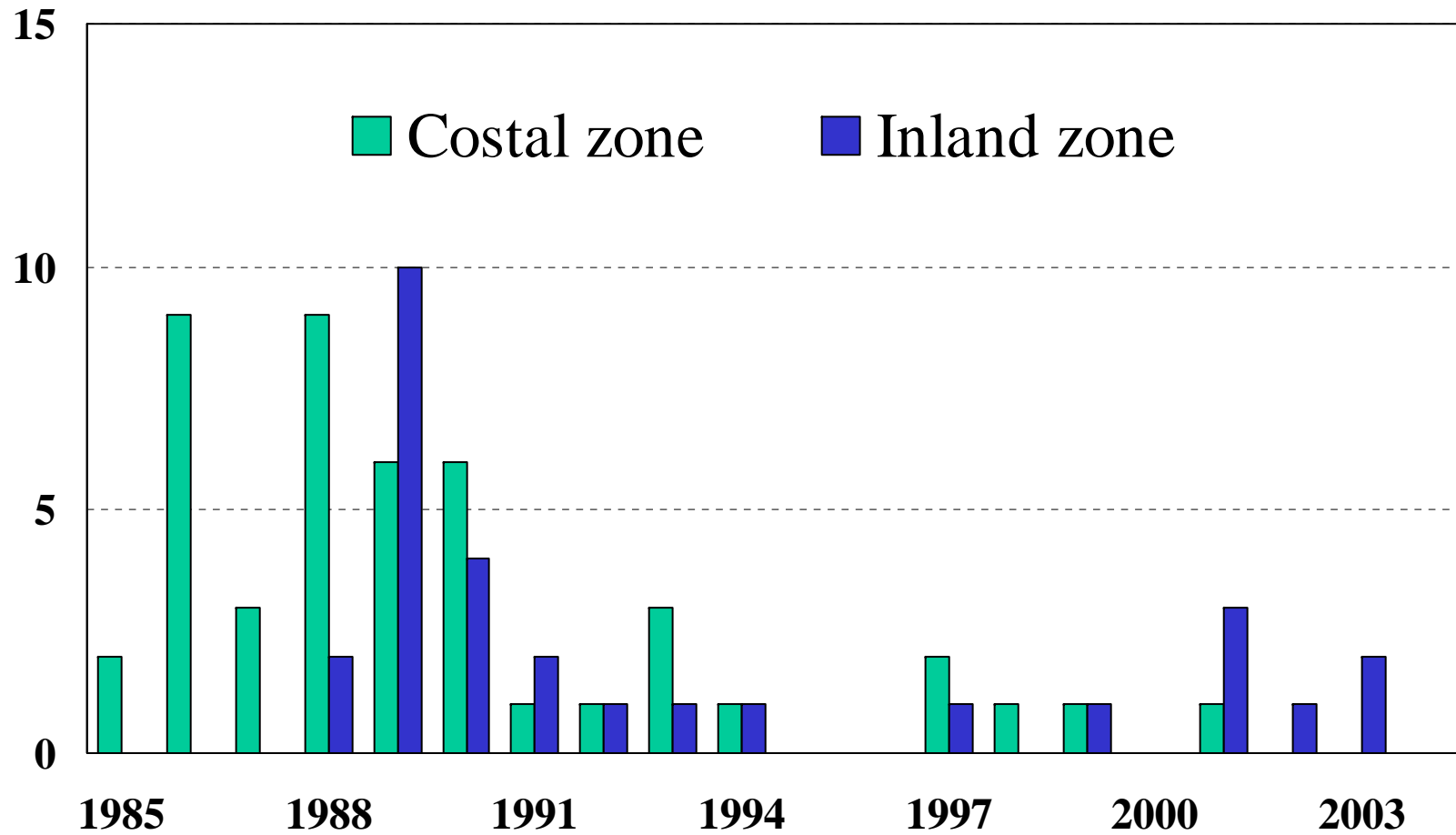
Tonnage Swedish Fish Farming 1983-2003



New Cases of IPN-V 1985-2004



New Cases of BKD 1985-2004



Methodology

- *Post mortem* examination after stripping; at least 50-70 % of the females used for stripping are *PM* examined
- Virus examination; organs (kidney, spleen and heart) or ovarian fluid
- BKD examinations; organs (*ie.* kidney)
- At least 50-70 % of the females are tested on organs (virus and BKD)

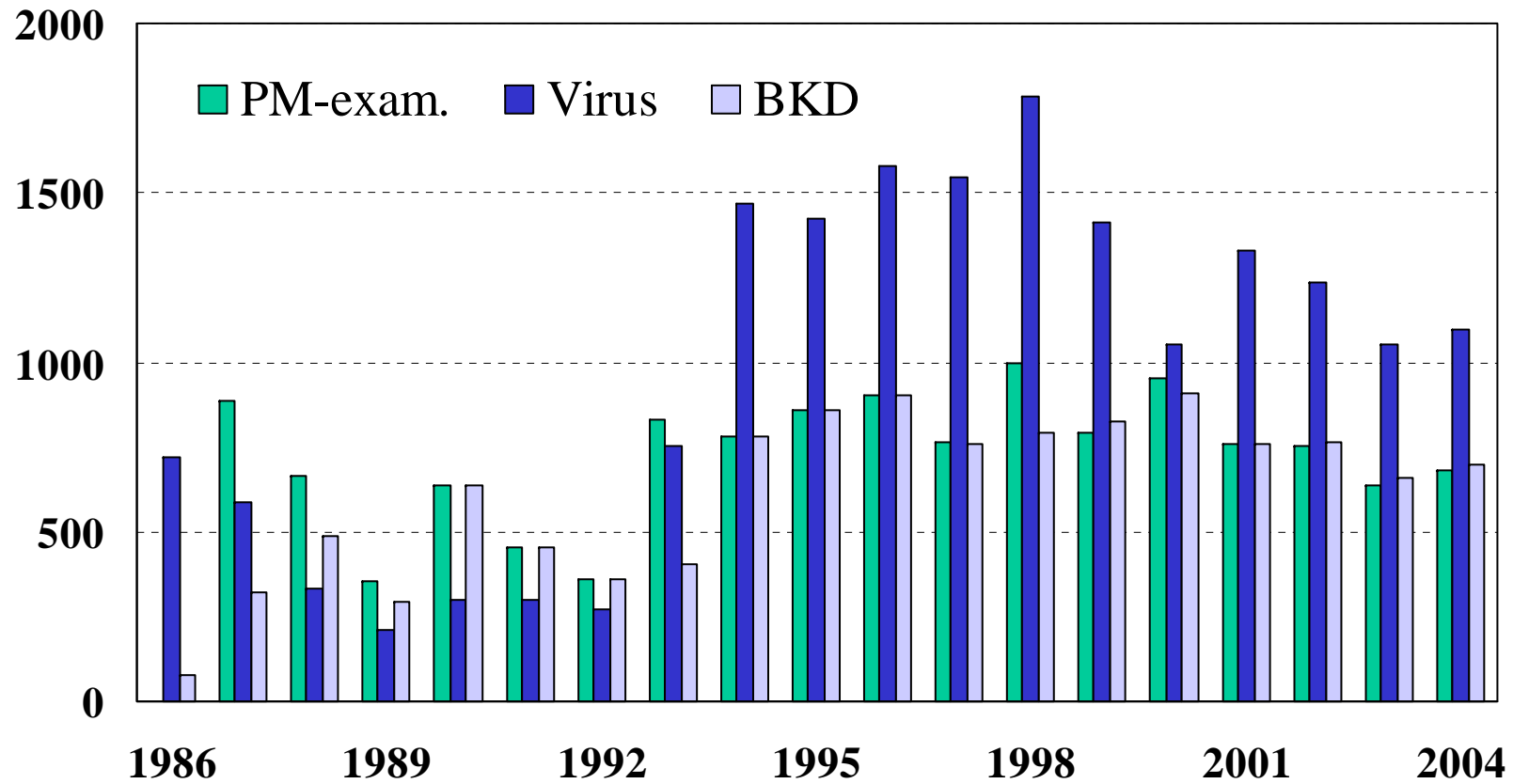
Diagnostics - virology

- National Veterinary Institute, Upsala
- During the period 1986-1992: 5 fish pool, kidney and spleen, RTG-2-cell-line only
- As from 1993 according to EC directive 92/532 (10 fish pool) two cell-lines BF-2, EPC/FHM) spleen, kidney and encephalon or heart

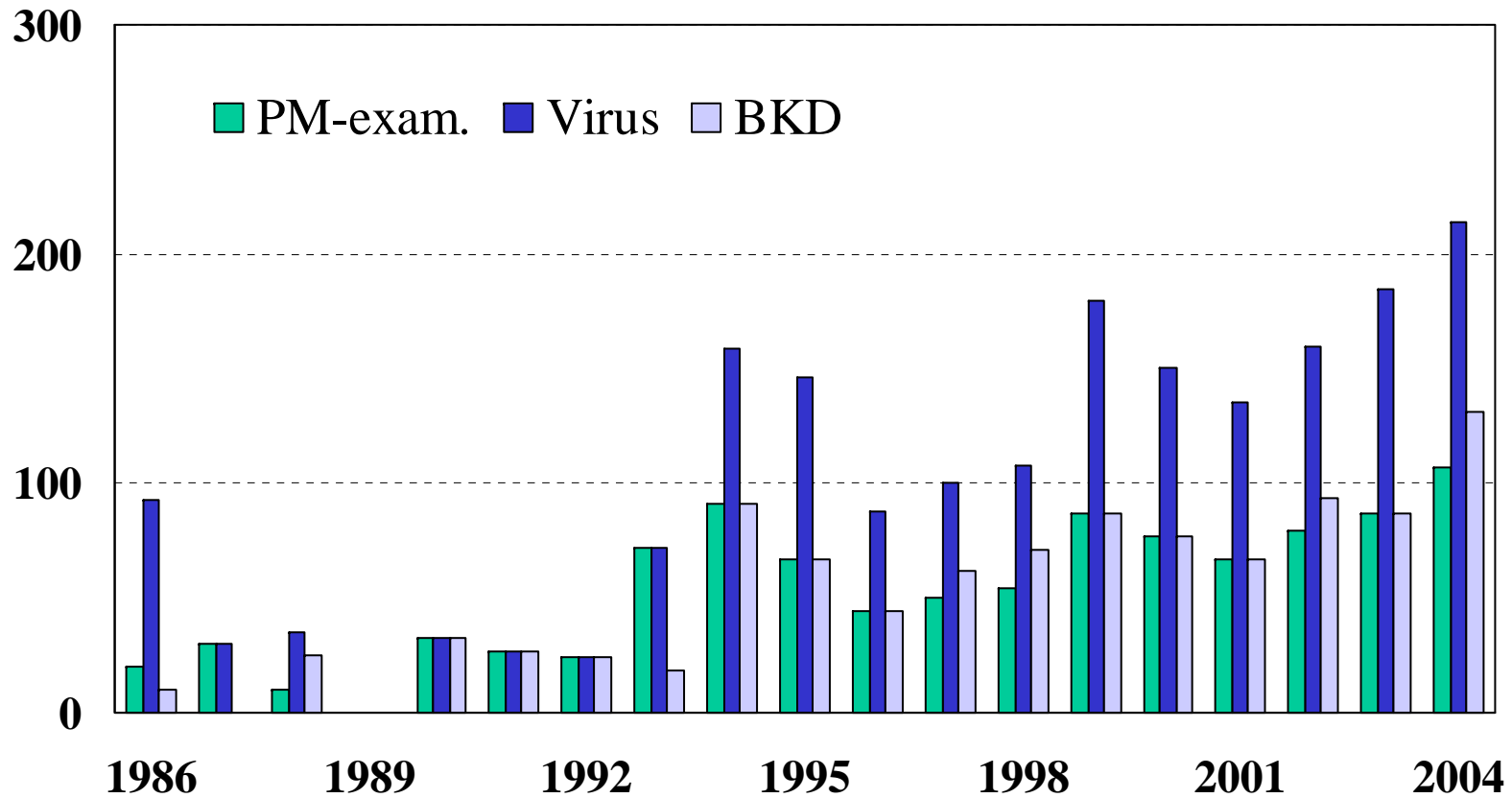
Diagnostics - BKD

- National Veterinary Institute, Upsala
- During period 1986-1993 according to 'SKDM-agar method' described by *Benediktsdottir et.al.* (1991). *J. Fish Dis.* **14**,97-102.
- As from 1994 ELISA-technique (polyclonal) described by *Janson et.al.* (1996). *Dis. Aquat. Org.* **27**,197-206.

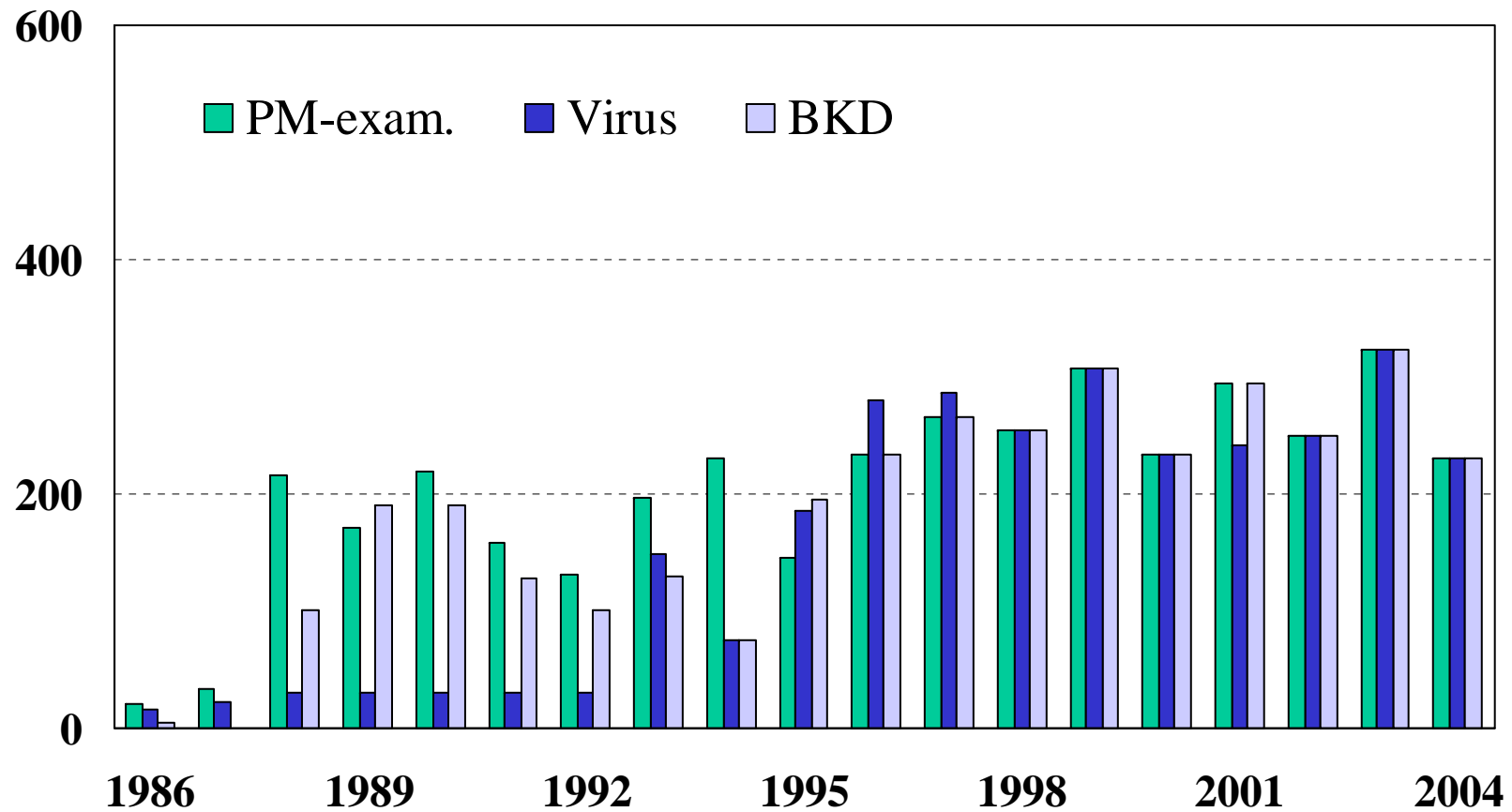
Baltic Salmon (8 rivers) – number of fishes examined



Atlantic Salmon (2 rivers) - number of fishes examined



Landlocked Salmon (1 river) – number of fishes examined



Results From Sampling

Strains = rivers	Baltic salmon (8 strains)	Atlantic salmon (2 strains)	Landlocked salmon (1 strain)
IPN-V (Sp) 1 case	-	Strain K (1994)	-
IPN-V (Ab) 1 case	Strain A (1992)	-	-
IPN-V (x) 2 cases	Strain B & H (1998 & 2004)	-	-
BKD 3 cases	Strain B (1998)	-	(1994 & 1995)

Other findings

- Furunculosis has been detected in 6 different cases/rivers
- Yersiniosis has been detected in 1 case/river

Criticism on the Methodology

- Low water temperature (1-5 °C) when sampling
- Only females are sampled
- Only clinical healthy fish, not moribund fish
- Ovarian fluid as reliable sample
- BKD diagnostics as SKDM-media (before 1994)

Criticism on the Programme

- New situation of cage rearing in the Baltic (Sweden and Finland)
 - Only rainbow trout, no Baltic salmon
 - Few geographical areas in Sweden with production
 - No farming activity in the river mouths

Main fish farming activity in Baltic area



Criticism on the Programme, cont.

- New situation of cage rearing in the Baltic (Sweden and Finland)
- Fish disease situation has stabilized and has improved

Fish disease situation

- Sweden is considered free of IHN-V, VHS-V and also IPN-V; both inland zone and coastal zone
- Still remain a small 'not VHS-V-free' coastal zone due to finding of a 'marine VHS-V' 2002 on the west-coast of Sweden
- Sweden has a control programme for BKD in the inland zone

Criticism on the Programme, cont.

- New situation of cage rearing in the Baltic (Sweden and Finland)
- Fish disease situation has stabilized and has improved (control programs/vaccination)
- Annual cost of the programme (100 000 €)

Questions - Future Problems

- Different IPN serotypes, virulence for (Baltic) salmon?
- Different VHS serotypes, virulence for (Baltic) salmon?
- The future of BKD?
 - Listing in the OIE-system and EU-regulation?