



# Land-based farming of Arctic char in Iceland

Valdimar Ingi Gunnarsson

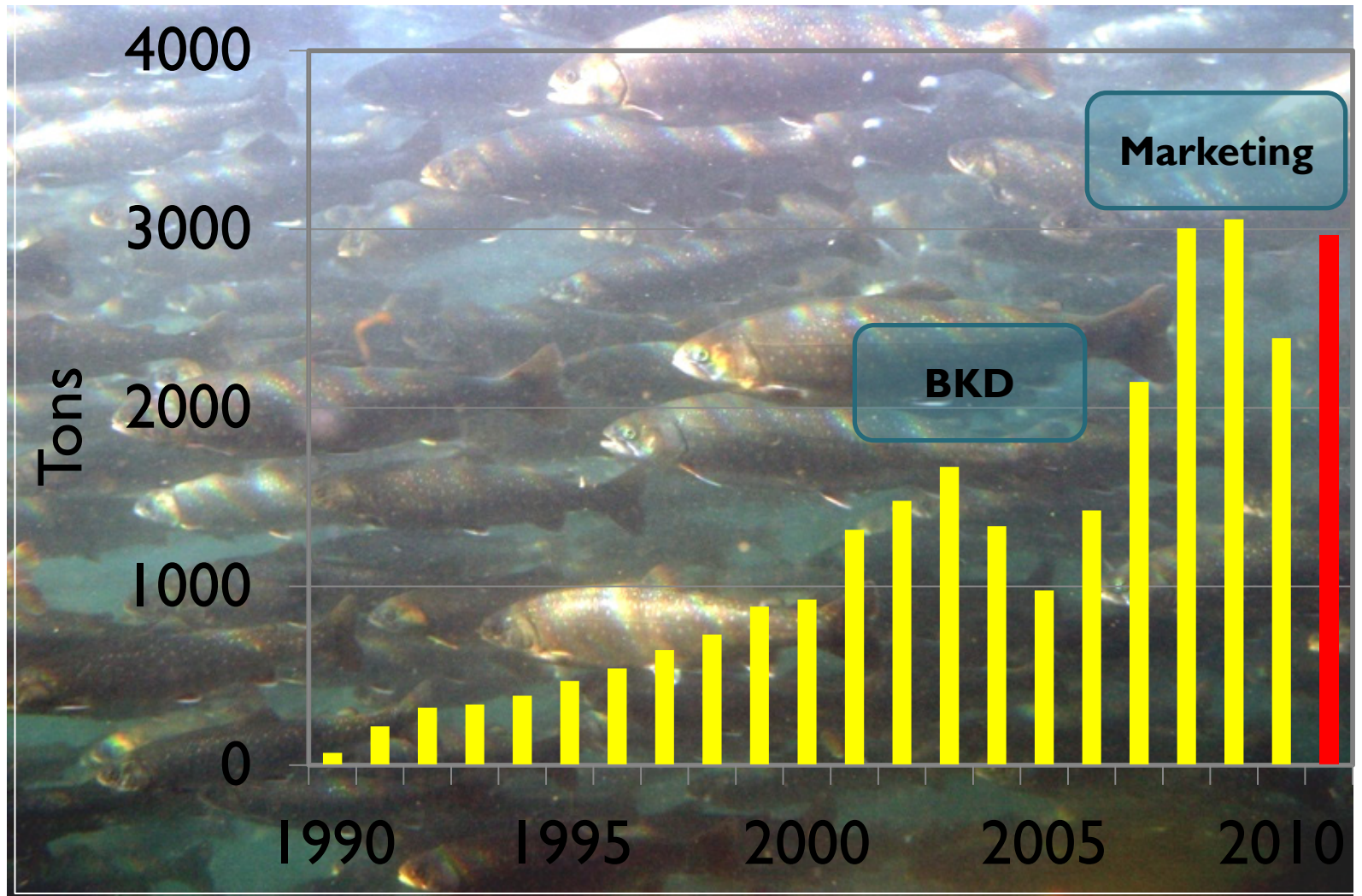
TEKMAR 2011: Britannia Hotell, Trondheim, tirsdag 6. og onsdag 7. desember 2011  
Sikker teknologi og kontrollert produksjon i en turbulent tid for folk, fisk og miljø

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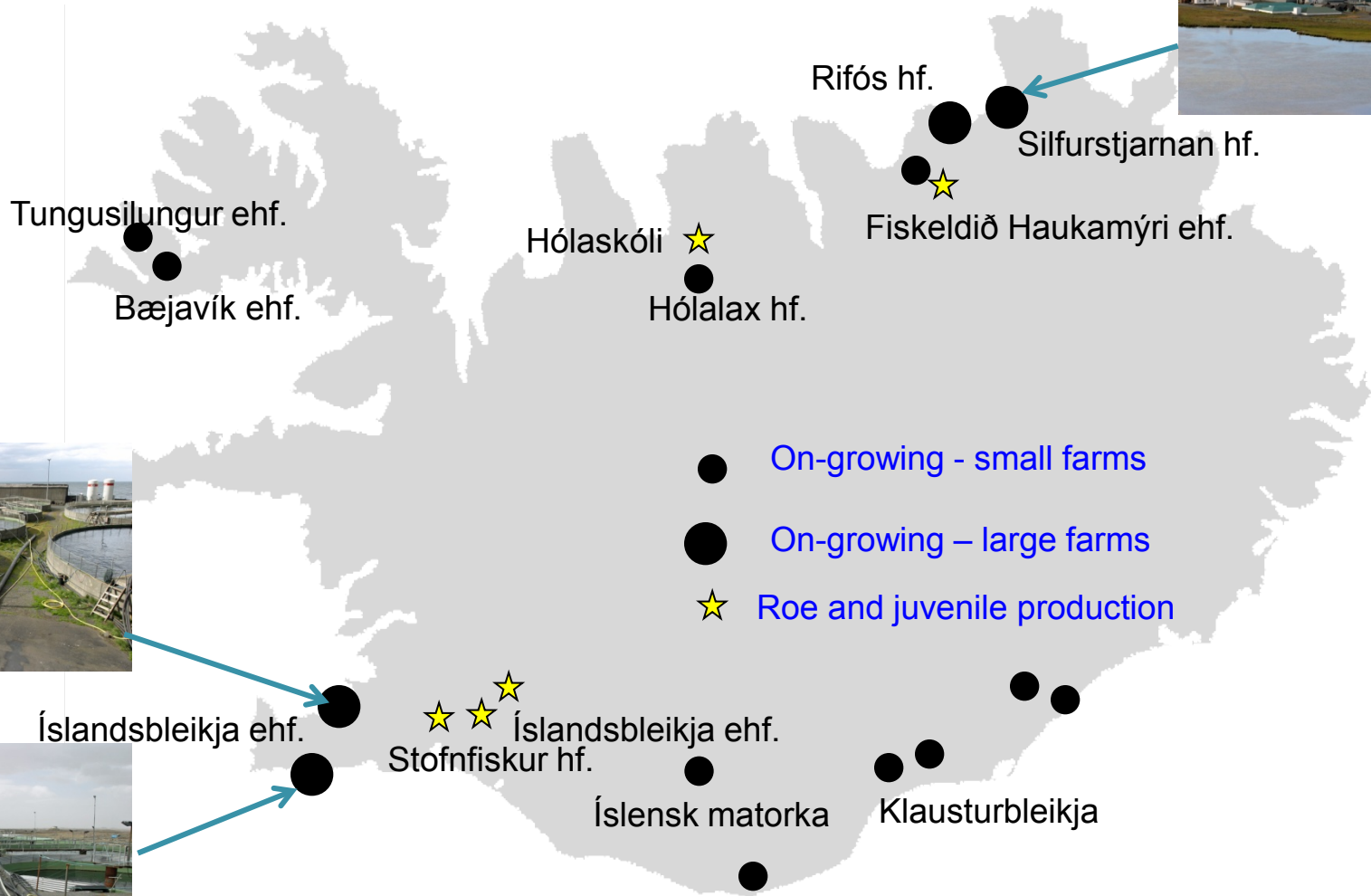


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# Production of Arctic char in Iceland



# Arctic char farms in Iceland



# Arctic char farms in Iceland

- Arctic char farms
  - Ca. 15 farms
  - Two land farms produce about 1,000 tons each
- Tanks
  - Circular tanks constitute the most common rearing-tank design in Iceland, but raceways are also used in a few instances.
  - The volume of a single tank is from a few cubic metres up to more than 2,000 cubic metres.
  - The most common tank materials are concrete, fibreglass, flat and corrugated steel.



# Arctic char farms in Iceland

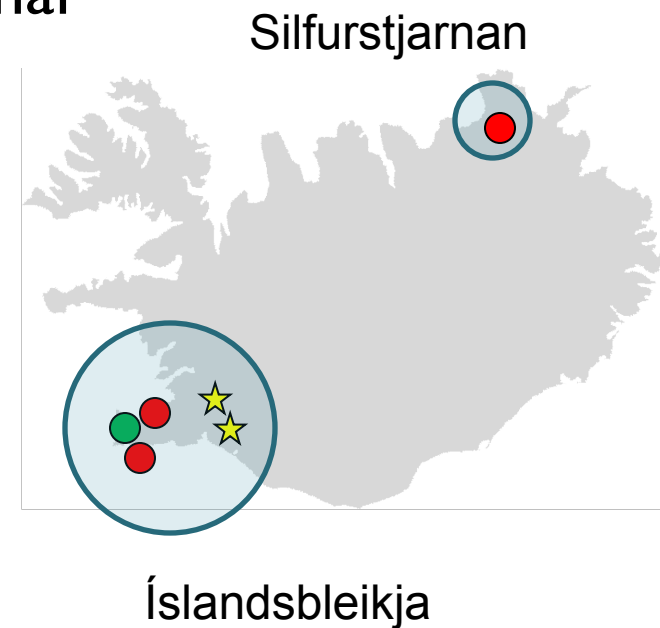
Íslandsbleikja ehf. (Samherji hf.)

- **Íslandsbleikja**

- Largest producer of Arctic char in the world.
- 70% of total production in Iceland
- 2 juvenile farm locations
- 2 on-growing farms
- Fillets production

- **Silfurstjarnan**

- On-growing farm

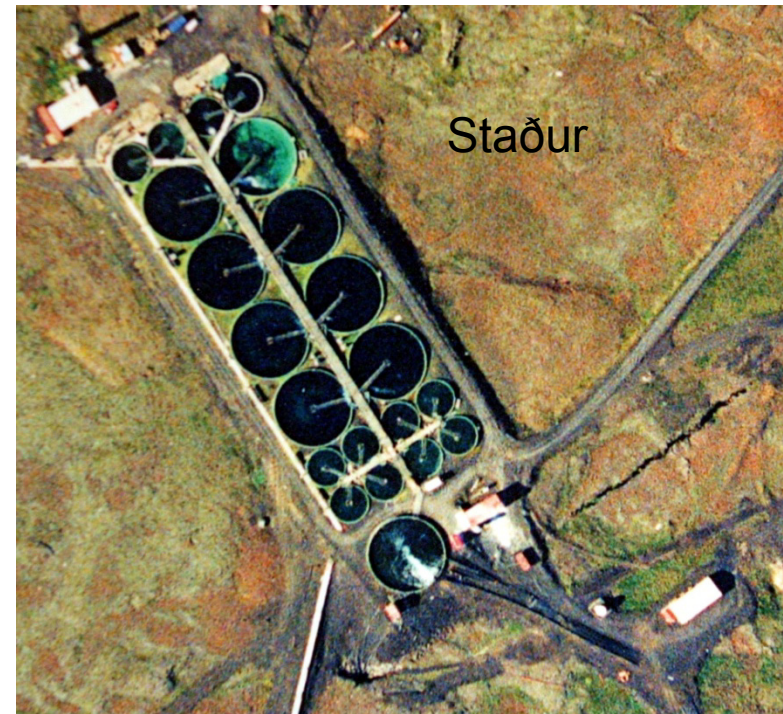


# Arctic char farms in Iceland

## Islandsbleikja



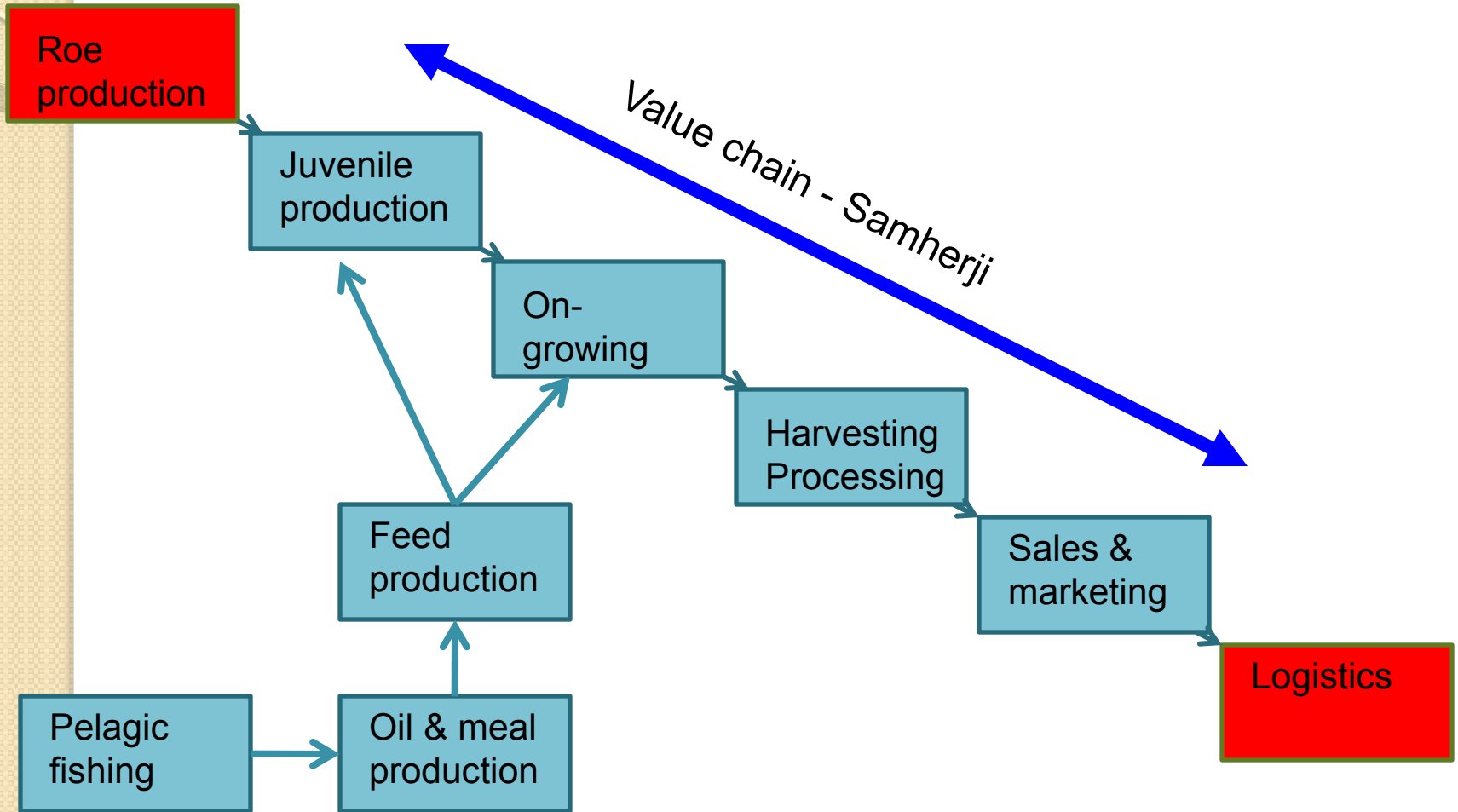
Volume: 26,000 m<sup>3</sup>  
Temperature 5.5-6.5°C  
Salinity 20-25 ppm  
Production capacity: 1,500  
tons/year



Volume: 25,000 m<sup>3</sup>  
Temperature: 6-7°C  
Salinity 20-25 ppm  
Production capacity: 1,500  
tons/year

# Arctic char farms in Iceland

## Íslandsbleikja ehf. (Samherji hf.)





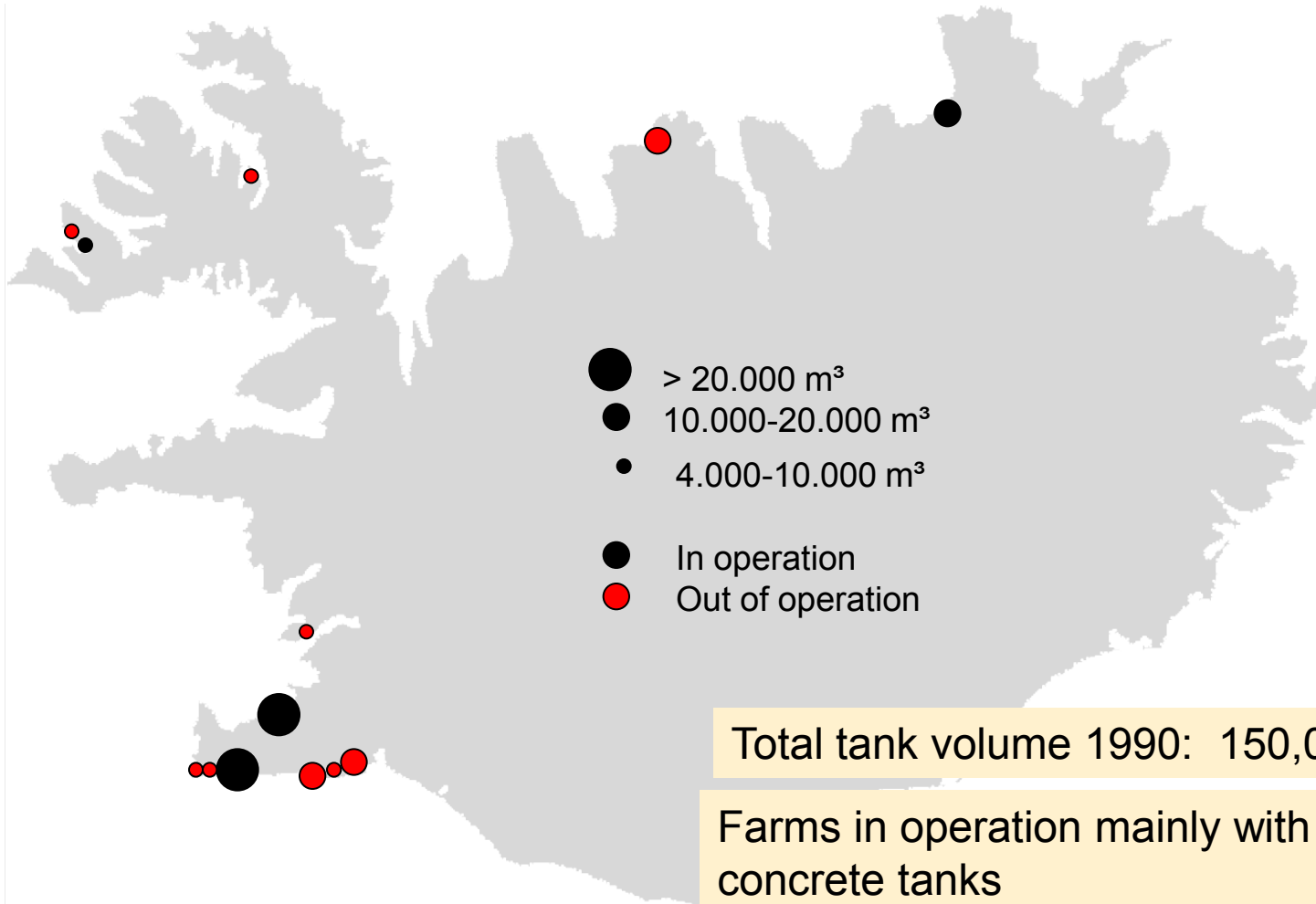
# Arctic char farms in Iceland

## Fiskeldið Haukamýri

- Volume: 2,500 m<sup>3</sup>
- Production capacity: 250 tons/year
- Water source:
  - Freshwater and geothermal water
  - 300 L/sec, ca. 10°C
  - Water reuse



# Land-based farms in 1990 and status 2011



# Land-based farms in 1990 and status 2011

- Why are many of the land-based farms not in operation today?
  - Bankruptcy, some more than once
  - Very expensive, 10x higher investment cost than cage farms
  - Operating cost higher in land-based farms (pumping cost....)



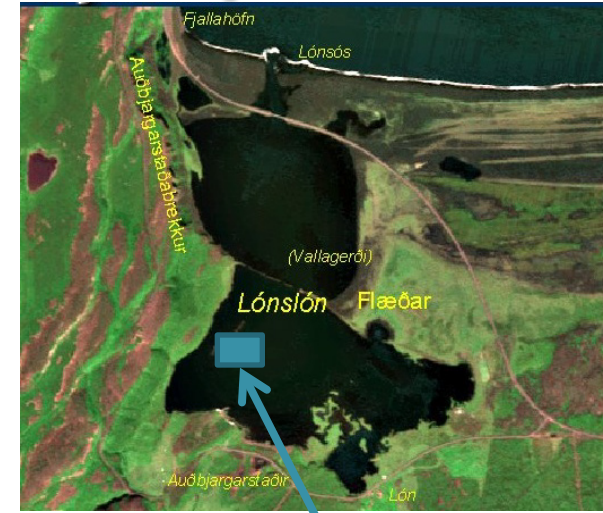
# Positive trends from 1990

- Concrete tanks in good condition after 25 years of operation
- Better utilization of water by oxygenation and aeration in tanks
- Increased density of fish in tanks
- Better self-cleaning of big tanks (2,000 m<sup>3</sup>)
- Improvement in logistic e.g. by pumping fish via effluent
- Trucking of live fish from farms to slaughterhouses



# Production methods today

- Production methods in Iceland
  - Difficult to produce char in sea cages (low growth rate and high mortality)
  - Difficult to produce Arctic char in fresh water lakes (high temperature in summer time....)
  - 90% of Arctic char produced in land-based farms - one cage farm located in a lagoon

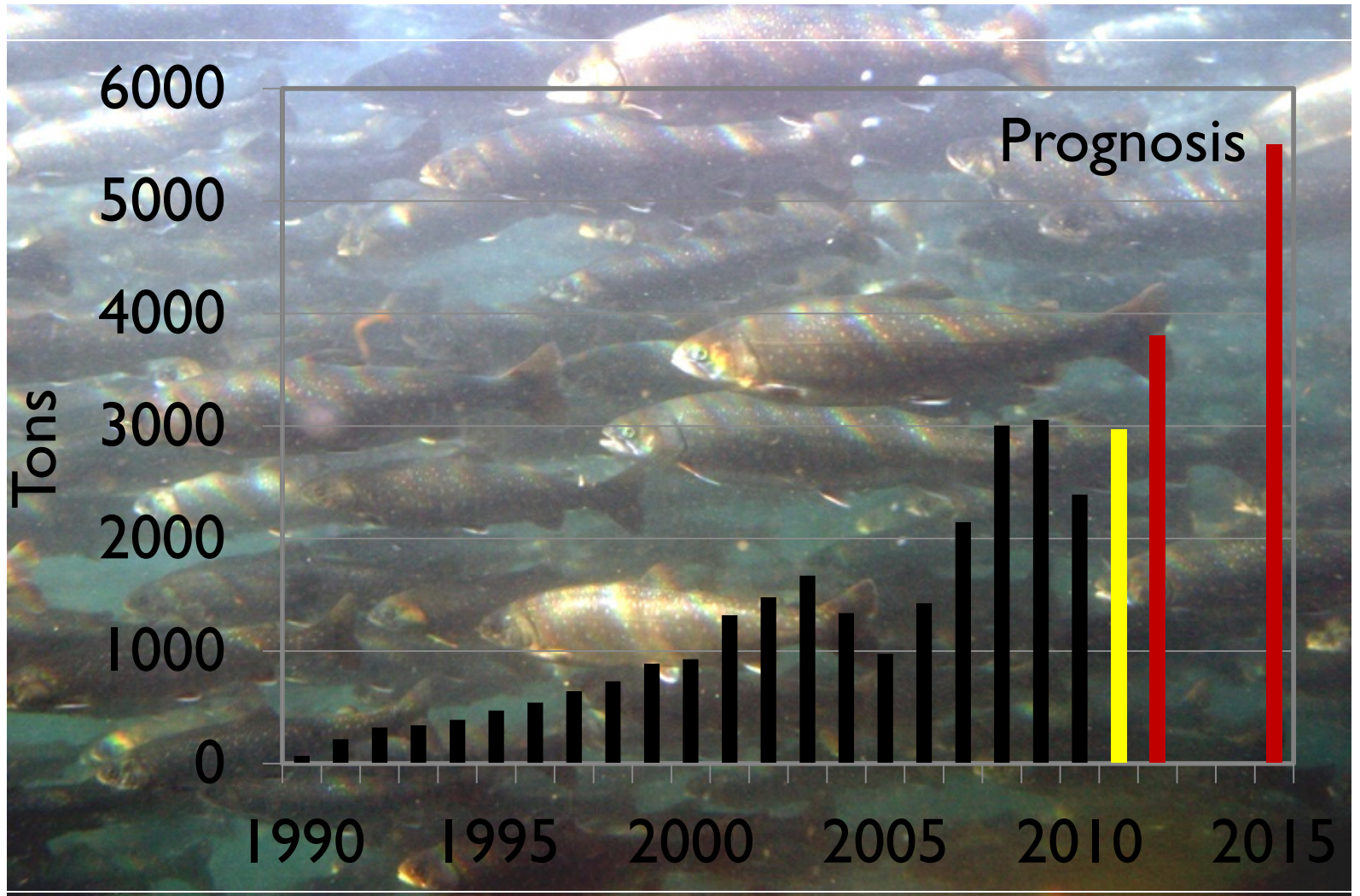


Rifós, location of cage



Silfurstjarnan produces Atlantic salmon, Arctic char, turbot and Atlantic halibut

# Future production



# Next step in up scaling Arctic char production

- The coming years will increase production capacity by expanding existing land-based farms
- Building new tanks or move tanks material from farms out of operation
- Tanks design:
  - Circular tanks and raceways
- Tanks material:
  - Tanks from farms out of operation: Enamelled steel, corrugated steel and fiberglass.
  - New tanks: concrete



# Next step in up-scaling Arctic char production

- Production technologies
  - Moving from flow-through aquaculture systems
  - to partial reuse of water within tanks
  - or in adjacent tanks units
- Better utilization of water without biofilters
  - Increasing aeration and oxygenation in tanks
  - Solids capture and oxygenation/aeration of water before reuse





# Er flytende lukket oppdrettsanlegg økonomisk forsvarlig?

	Oppdretts- mærer (2009G)	Flytende, lukket oppdrettsanlegg
Smolt	1,74	1,7
Fór	9,14	9,0
Forsikring (biomasse)	0,15	0,1
Lønn	1,02	0,9
Helse	0,58	0,2
Rep. og vedlignhold	0,58	0,2
Andre kostnader	0,88	2,0
Avskrivinger	0,44	1,34
Finans (anlegg)	0,93	2,68
	<b>15,43</b>	<b>18,12</b>

Referanse: Norsk fiskeoppdrett 36(7):20-21

# Increased competitiveness of land-based farms

- Reduce depreciation/interest cost per kg fish produced
  - Build cheap land-based farms, e.g. without biofilters
  - Build bigger tanks ( $> 2,000 \text{ m}^3$ )
  - Increased production per cubic meter from ca. 40 kg up to 75 kg
  - Build land-based farms with a long lifetime (more than 50 year for tanks and pipes)
- Reduce energy cost per kg fish
  - Pumping cost
  - Oxygenation or aeration
  - Increasing reuse of water



# Increased competitiveness of land-based farms

- Reducing feed cost
  - No overfeeding by better equipment for inspection
  - Better management of environmental factors affecting the feed conversion factor (temperature, oxygen, flow rate, water quality etc.)
- Reducing labor cost
  - Increase the productivity to levels seen in sea cage farms in Norway (>400 tons per man/year)
  - Increase technological standards
  - Increase size of the land-based farms and single tank volume, etc.



# R&D work in Iceland

- Aim of one land-based project
  - Design based on the following key words: simple, cheap, safe and minimal environmental impact.
  - Organizing the farms to improve working conditions and increase productivity
  - Disseminate knowledge to farmers and identify important research and development work.



# Future land-based farms

- Not the proper time to build new land-based farms
  - the challenge is to increase competitiveness of land-based farms with research and development work
- Work together to develop the future land-based farms





**Thank you for your attention**