



Status, monitoring and protection of noble crayfish in Norway

Stein Ivar Johnsen

Overview

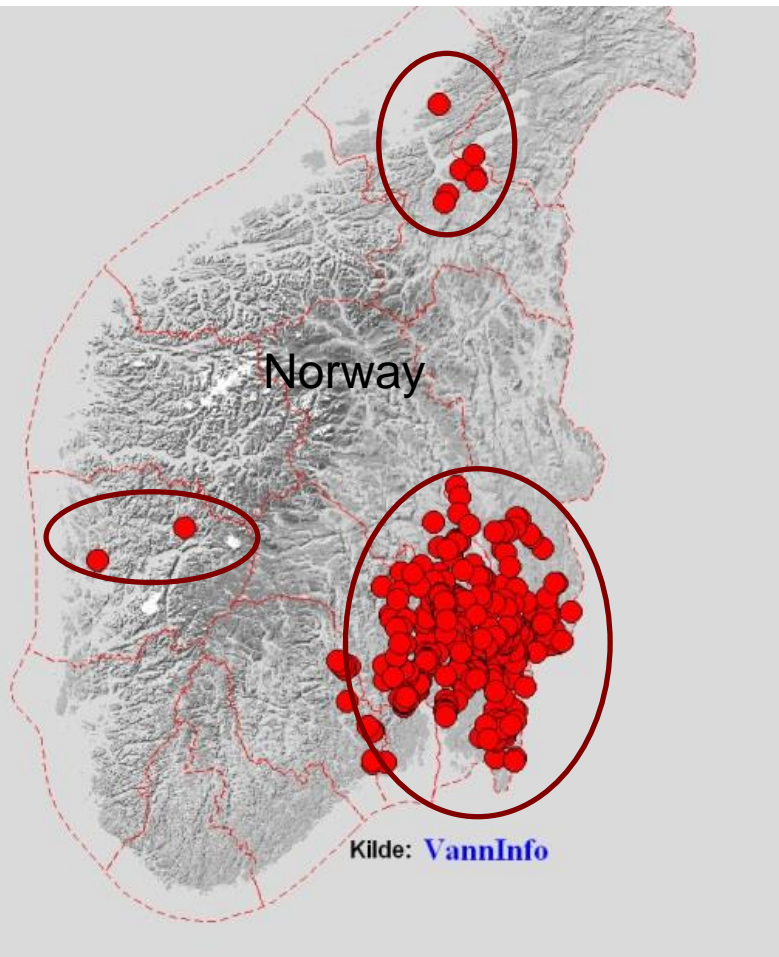
- ▶ Noble crayfish in Norway
 - ▶ Distribution and population status
 - ▶ Exploitation
- ▶ Management
 - ▶ Authorities and committees
 - ▶ Legislation
 - ▶ National monitoring programme
- ▶ Threats and protection measures

Population status



- ▶ Data from 659 populations are recorded
- ▶ About 470-480 known populations today

Distribution of noble crayfish in Norway



- ▶ Main distribution in the south-eastern part of Norway
- ▶ Most (perhaps all) populations are a result of stocking
- ▶ Regarded as an indigenous species



Exploitation

- Due to crayfish demands from Sweden, crayfish fisheries expanded in Norway during the last century
- The greatest yield was in 1966 with about 40 tonnes (30 exported)
- From around 1990 the annual yield of crayfish has been about 10-12 tonnes
- This represents a reduction of ~ 75 % compared to 1966

Management of noble crayfish



Authorities

Ministry of climate
and environment

Ministry of
Agriculture and Food

Norwegian
Environment Agency

Norwegian Food
Safety Authority

County governor

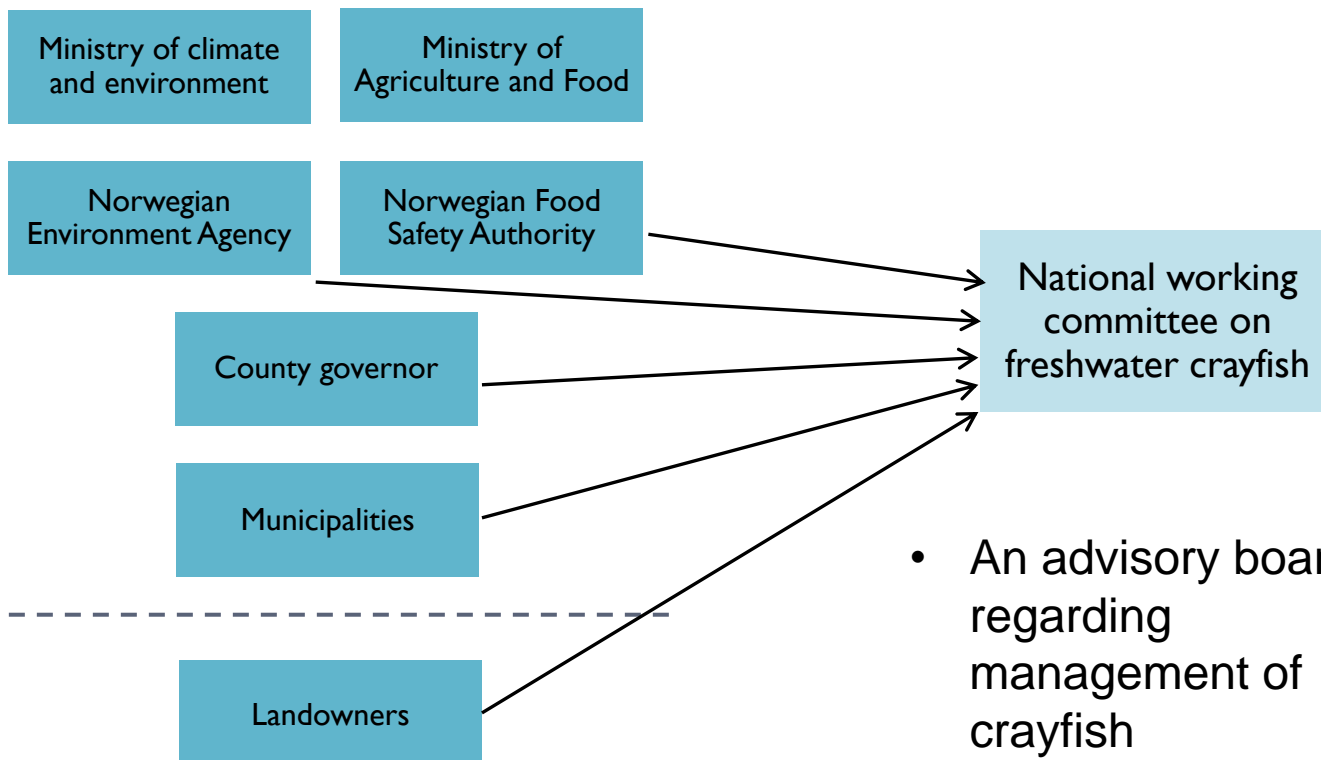
Municipalities

Landowners

Management of noble crayfish



Authorities



+ Two research Institutes (crayfish ecology and crayfish disease)

- An advisory board regarding management of crayfish

Management of noble crayfish



- ▶ Noble crayfish have status as «threatened» on the national red list
- ▶ However:
 - ▶ Conservation and exploitation are no contradictions
 - ▶ People who benefit from the crayfish population will protect it!

Benefits for landowners

- ▶ Market price about 50-60 Euro/kg
- ▶ In our best crayfish locality
 - ▶ Landowners may earn up to 15000 Euros in a month
 - ▶ Rent out fishing rights for 1000-1500 Euros
 - ▶ Crayfish tourism



Legislation

– National regulations



- ▶ Legal fishing season: 6.august – 15. sept.
- ▶ Minimum size: 95 mm (total length)

However

- ▶ Landowners may enjoin/limit the rules
 - ▶ Decrease fishing season
 - ▶ Increase the minimum size
 - ▶ Effort limitations



National monitoring programme



- ▶ Started in 2001
- ▶ Objective: Monitor a range of noble crayfish localities in order to reveal prominent changes in population density



Noble crayfish – national monitoring

- ▶ The localities differs in:

Trophic level

Calcium and pH levels

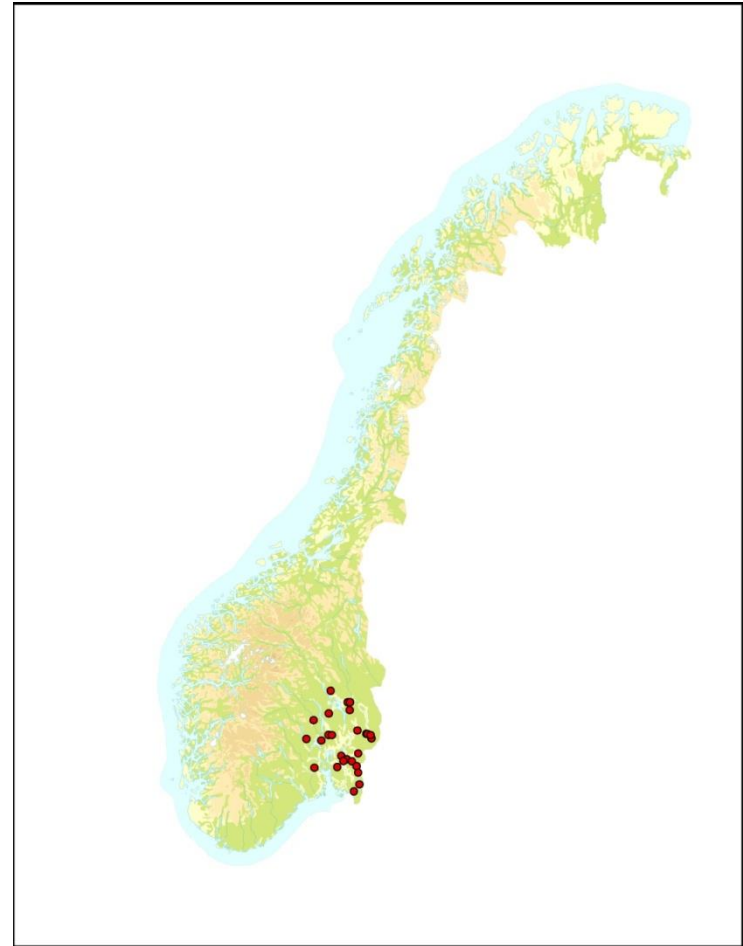
Hydroelectric influence

Time of stocking

Harvest pressure

- ▶ 27 localities included in 2001

- ▶ 9 are extinct due to crayfish plague



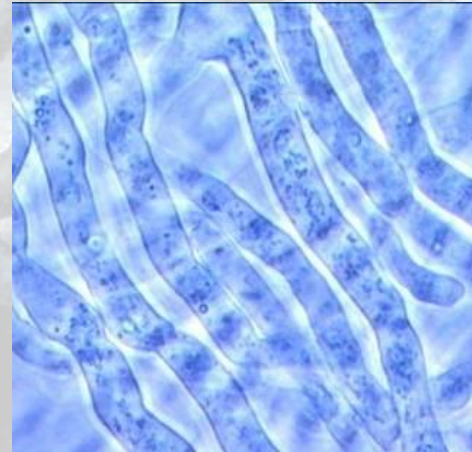
Noble crayfish – national monitoring

- ▶ 5 localities investigated each year
- ▶ Monitoring parameters:
 - ▶ Crayfish / trapnight
 - ▶ Crayfish / hour diving
 - ▶ Catch statistics
 - ▶ Water chemistry
- ▶ There will be changes
 - ▶ Include eDNA
 - ▶ trace target species and threats



Threats and conservation measures

pH/Ca



Threat: Acidification

Measure: Liming



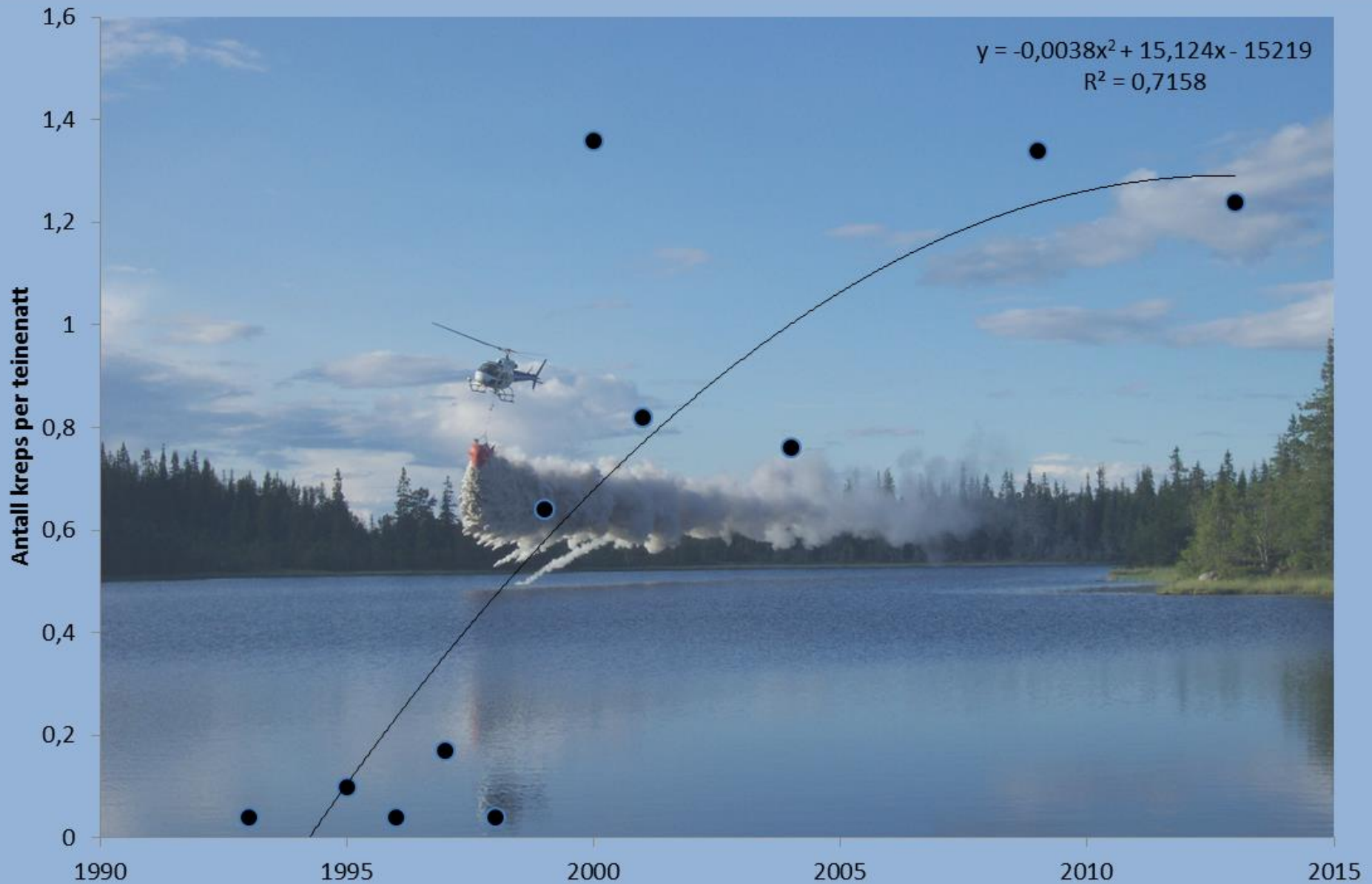
- ▶ Crayfish prefer $\text{pH} > 6.0$ and calcium (Ca) levels $> 4\text{-}5 \text{ mg/l}$
- ▶ Many Norwegian crayfish localities with $\text{Ca} < 3 \text{ mg/l}$
- ▶ Some crayfish localities are being limed

However

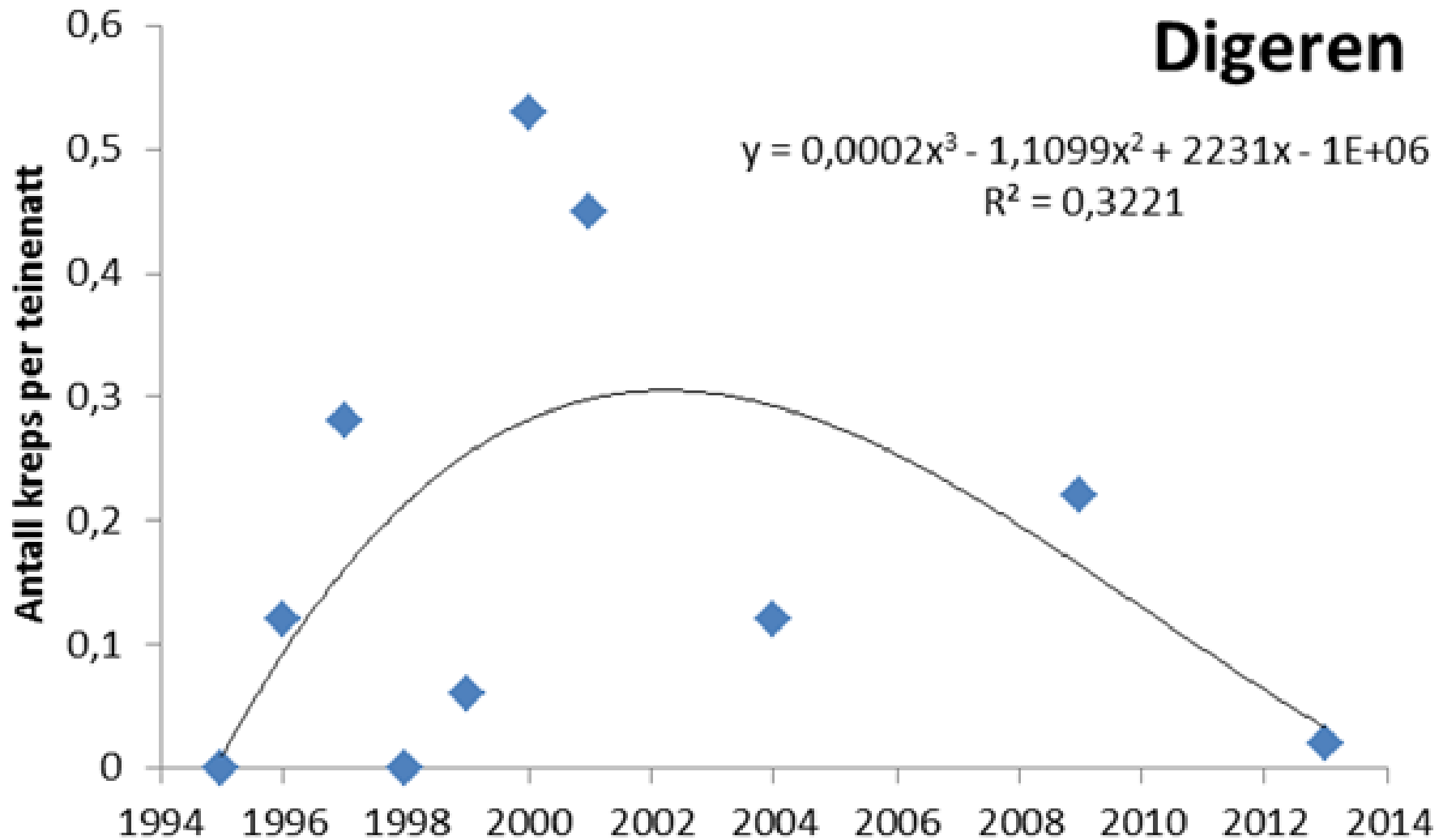
Liming are not targeted towards crayfish!

- ▶ Limestones instead of lime «powder»?

Acidification – Example 1



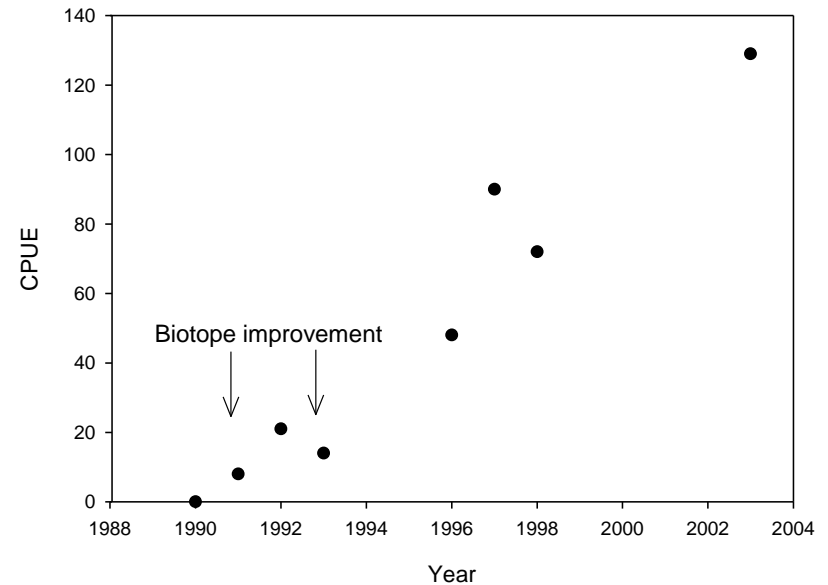
Acidification example 2



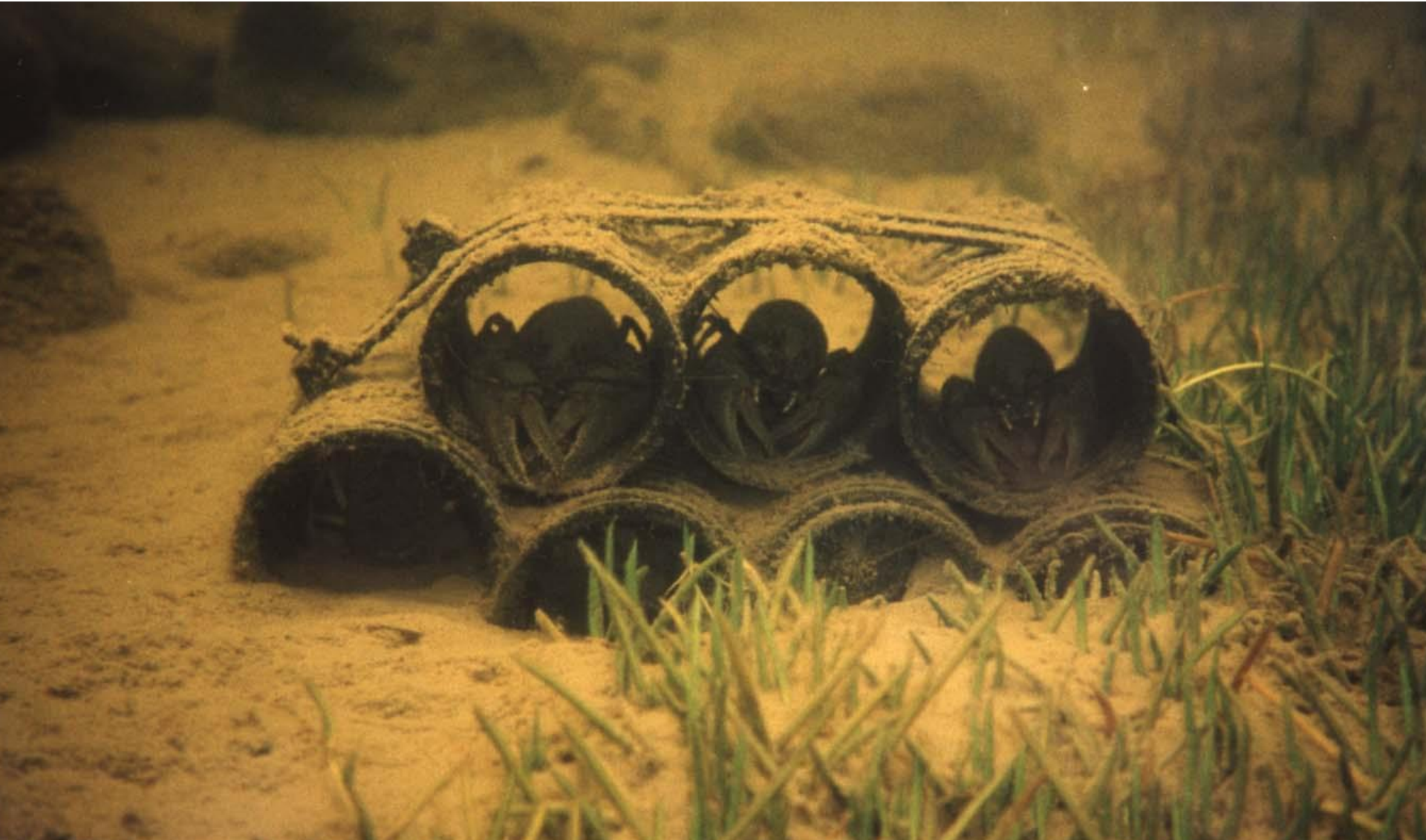
Threat: Habitat alteration/degradation

- ▶ Example siltation
 - ▶ Run-off and erosion from agricultural land
 - ▶ Clogging of suitable crayfish habitat/shelter
 - ▶ Probably a main cause of decrease in many noble crayfish populations

- ▶ Add stones – get crayfish?

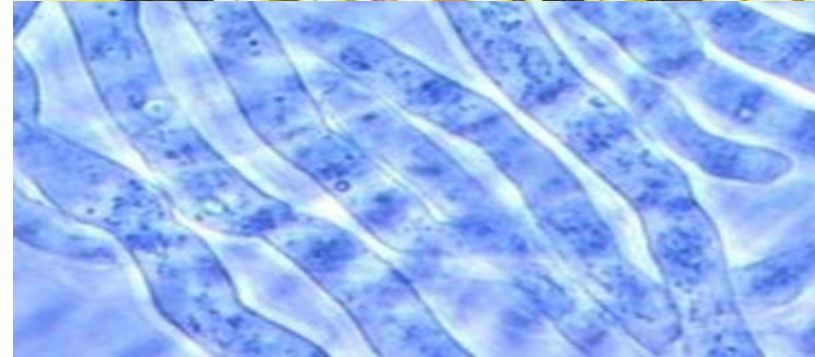


Crayfish like and need shelter!!

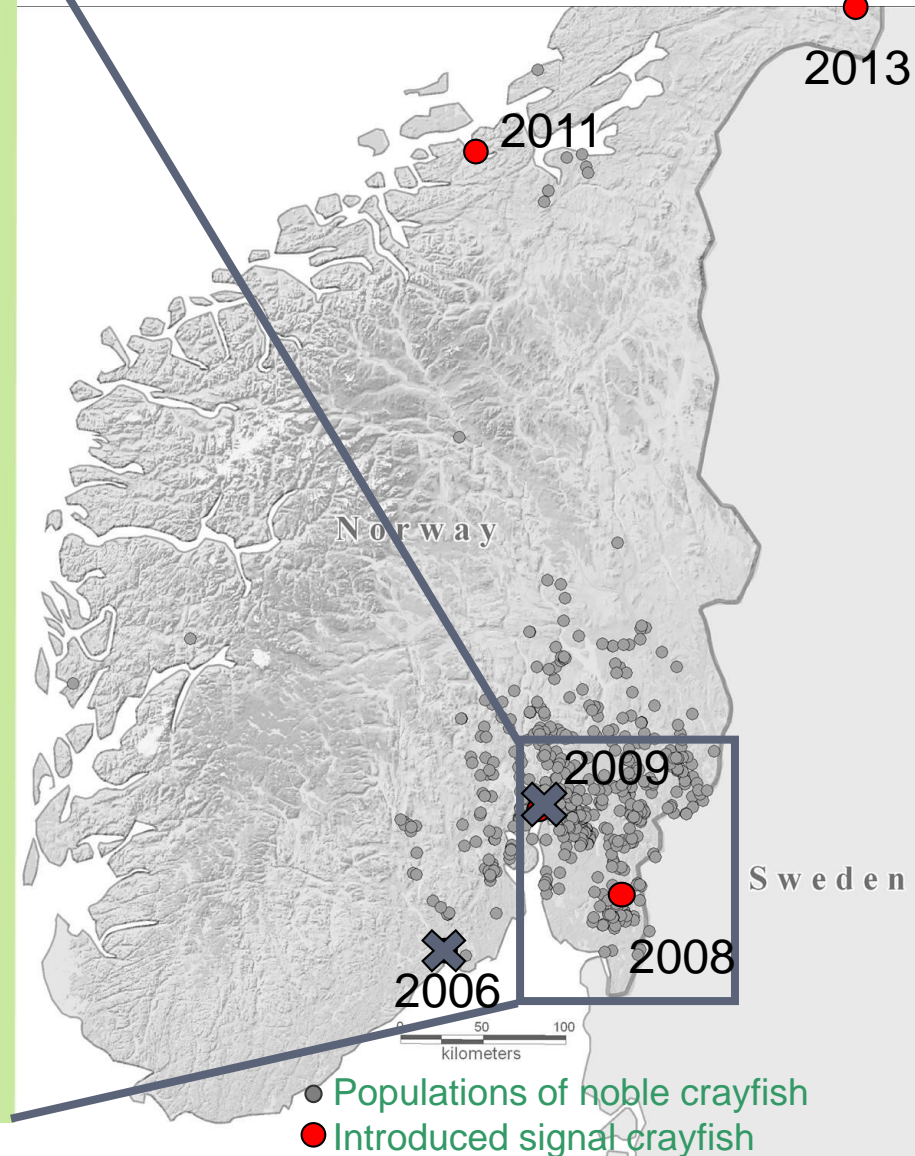
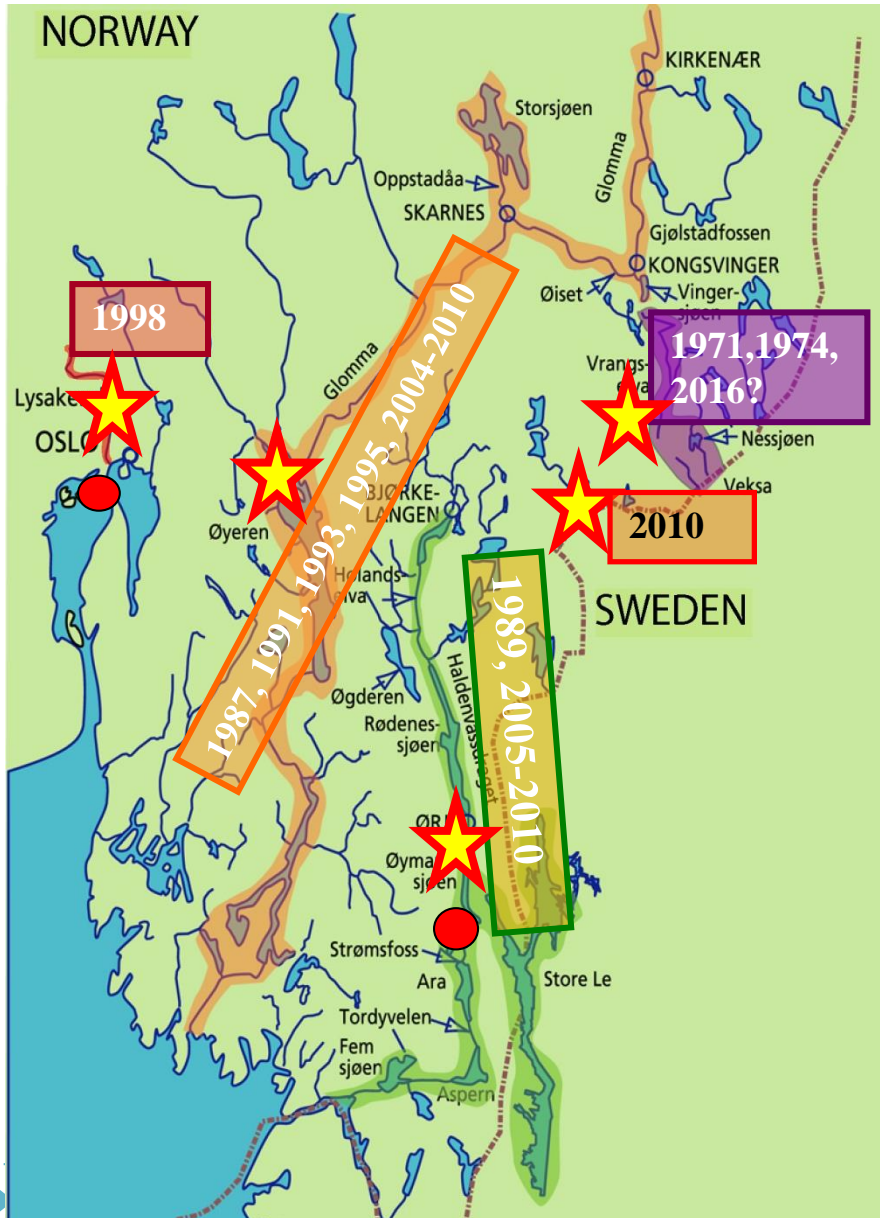
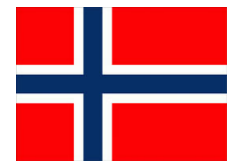


Crayfish plague and signal crayfish

- ▶ Stocking of alien crayfish species are forbidden in Norway
 - ▶ **Sentencing framework of 6 years in prison**
- ▶ Localities with signal crayfish
 - ▶ No harvest allowed

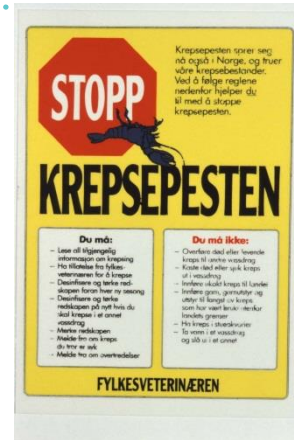


Crayfish plague and signal crayfish in Norway



Crayfish plague and signal crayfish – protection measurements

- ▶ Legislation
- ▶ Information
- ▶ Eradication
 - ▶ Positive results in small water bodies



Eradication with BETAMAX VET.

- ▶ Two small watersheds treated in Norway
- ▶ Synthetic pyrethroids, a common agent in commercial insecticides
- ▶ Crayfish extremely sensitive



Eradication continue

- ▶ Two treatments with Betamax
 - ▶ Two weeks in between
- ▶ Draining
 - ▶ Left dry over winter
- ▶ Follow-up programme
 - ▶ Baited traps
 - ▶ Caged noble crayfish



Norway vs the Czech Republic

- ▶ Exploitation
 - ▶ Optimal harvest and protection
- ▶ Norway have only one species of:
 - ▶ native crayfish
 - ▶ alien crayfish
 - ▶ Always infected with crayfish plague (so far)



