Scheepvaart en ecologische doelstellingen

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25 April 2008

Rijkswaterstaat

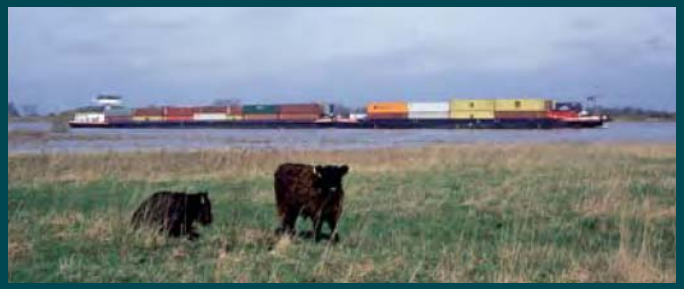
The Rhine Delta

Navigation on the Rhine

Busiest river in Europe

165,000 ships/year (max 6-barge tugs)

160 million ton goods/year



Dutch Government policies on main river interests

- Increase flood protection levels
- Increase inland water transport potentials
- AND increase ecological potentials

Today the European Water Framework Directive (WFD) plays a structuring role

EU Water Framework Direction

What's in the law?

- Make water quality (chemical & ecological) as good as possible,
- Maintaining navigation, flood control and water supply.
- Before 2015 (delay 2027)

Biological Water Quality

algae

fish

macro invertebrates

water plants

The Rhine in the Netherlands

The Rhine in the Netherlands

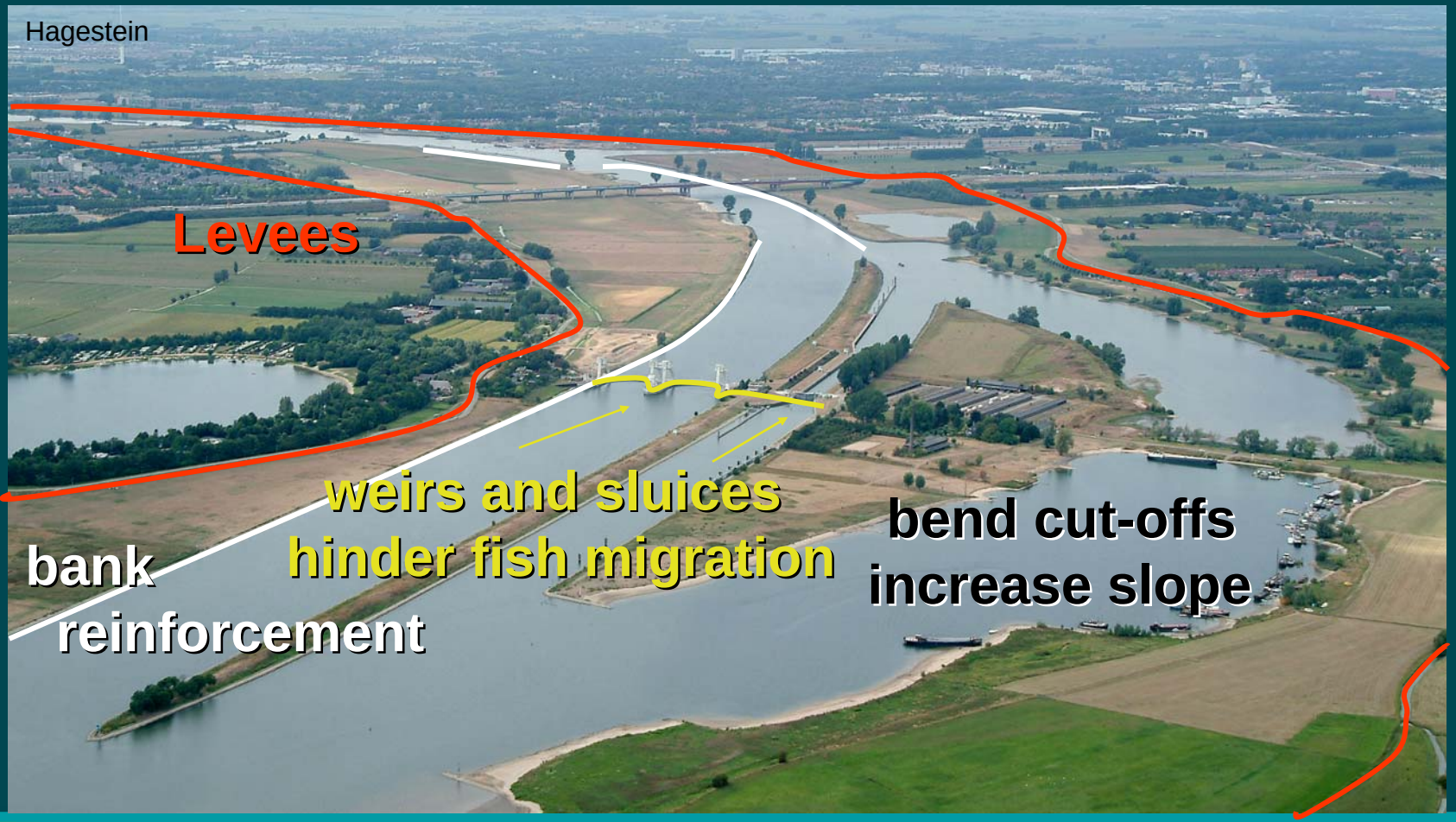
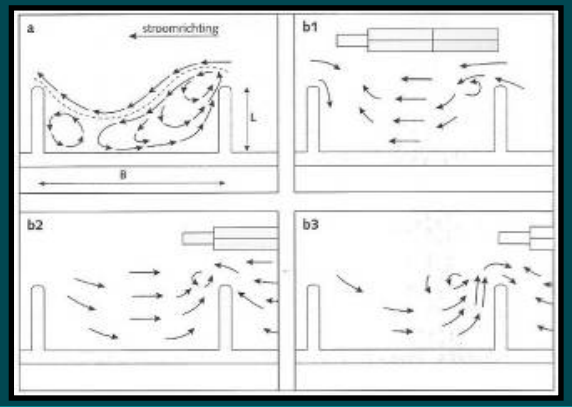


photo: B. Boekhoven

2 major effects of navigation

1. Lack of shallow flowing water
   (due to straightening and deepening)
2. High exposure to waves and suction


photo: B. Boekhoven



Biological needs

Shallow and clear water with low turbulence

River bed with low turbulence
Sandy banks & woody debris & water plants

Slow flowing water for resting and young fish,
Spawning grounds like flooded grassland and sand bars
Free migration in river basin

Current situation → few amounts of specific riverine species

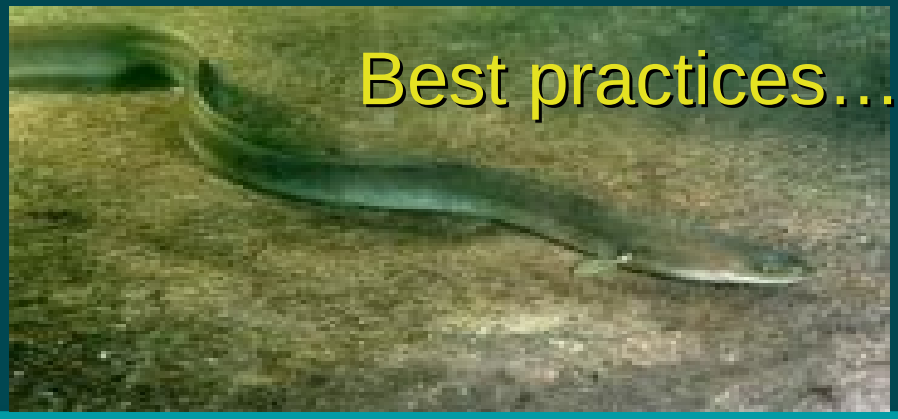
Ecological perspective

- Navigation channel suitable for migration and dispersion of species

  Conditions: fish passages in weirs,
  annual flood pulse in floodplain

- Navigation channel is not a good habitat

Improve habitats near banks and in floodplains

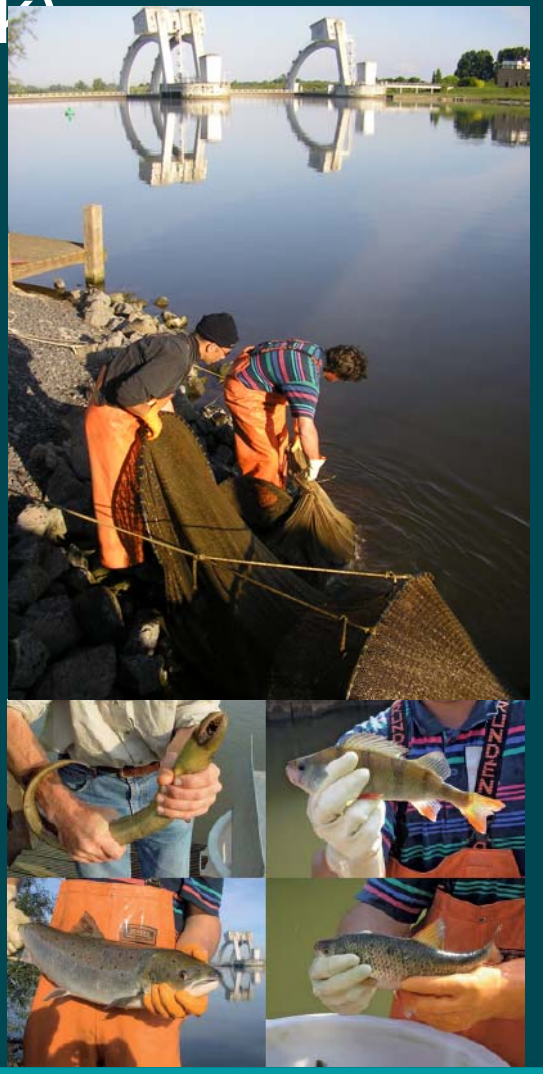


1) Fish passages (Nederrijn, Lek)

constructed 2001-2004

For upstream migration of fish

Amerongen



2) Side channel Gameren (Waal)

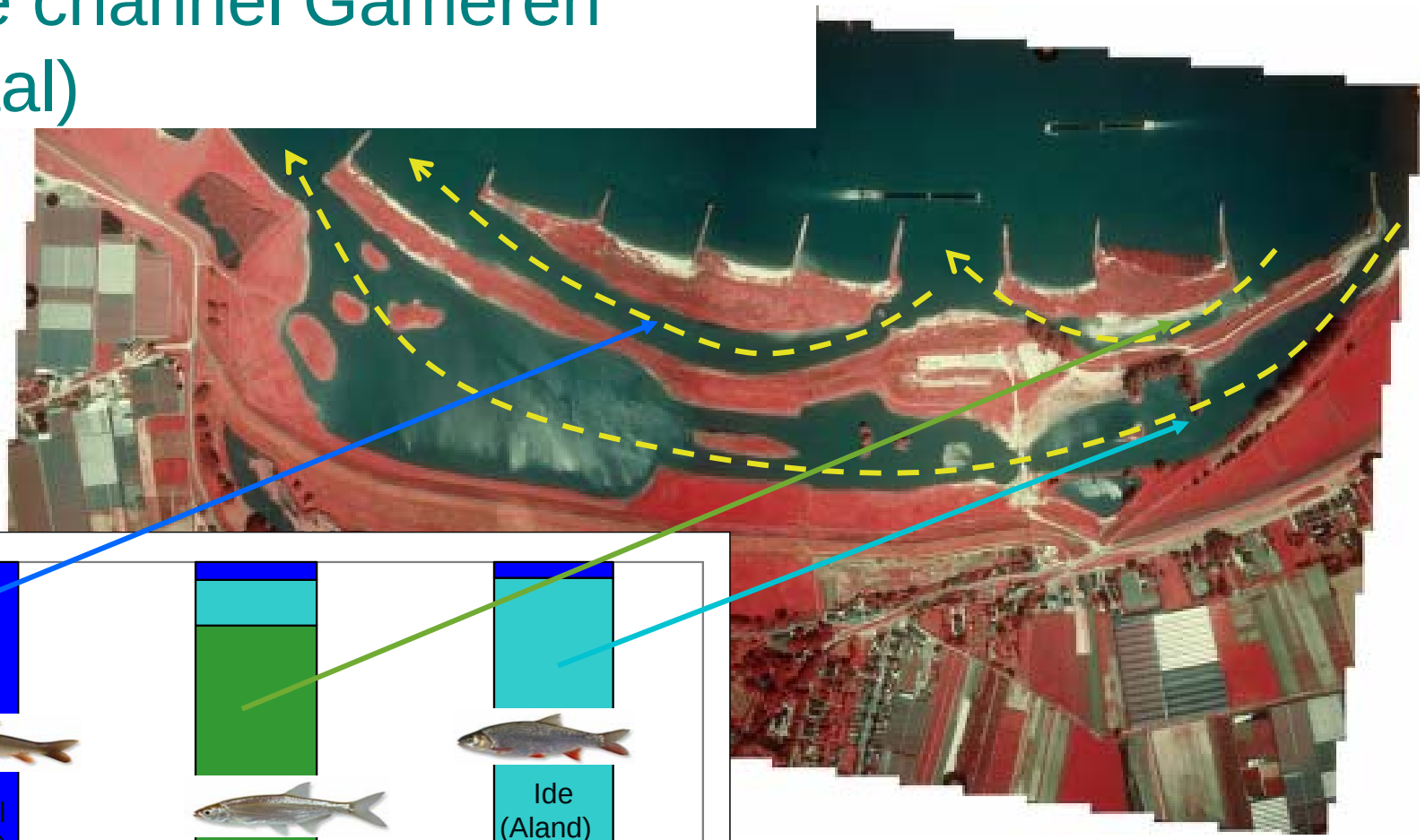
- 3 % of discharge Waal
- No significant accretion in navigation channel

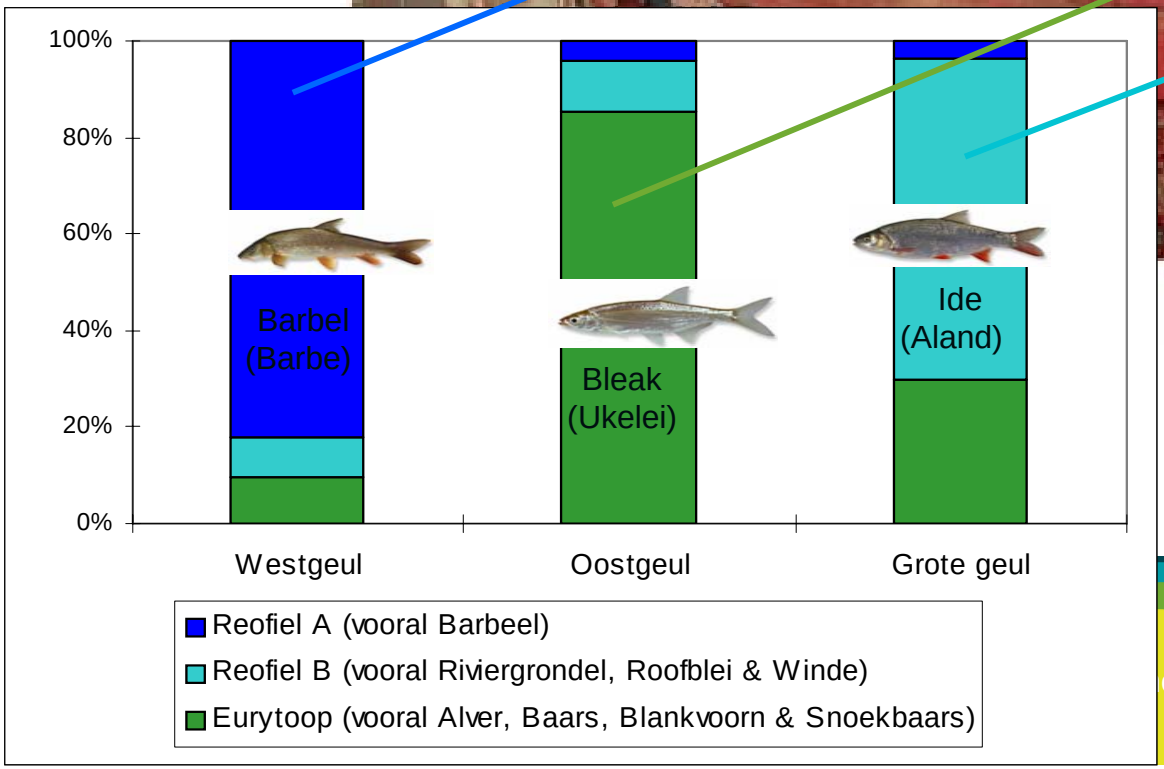
ship-induced disturbance in side channel

flow in downstream direction

reversal during ship passage

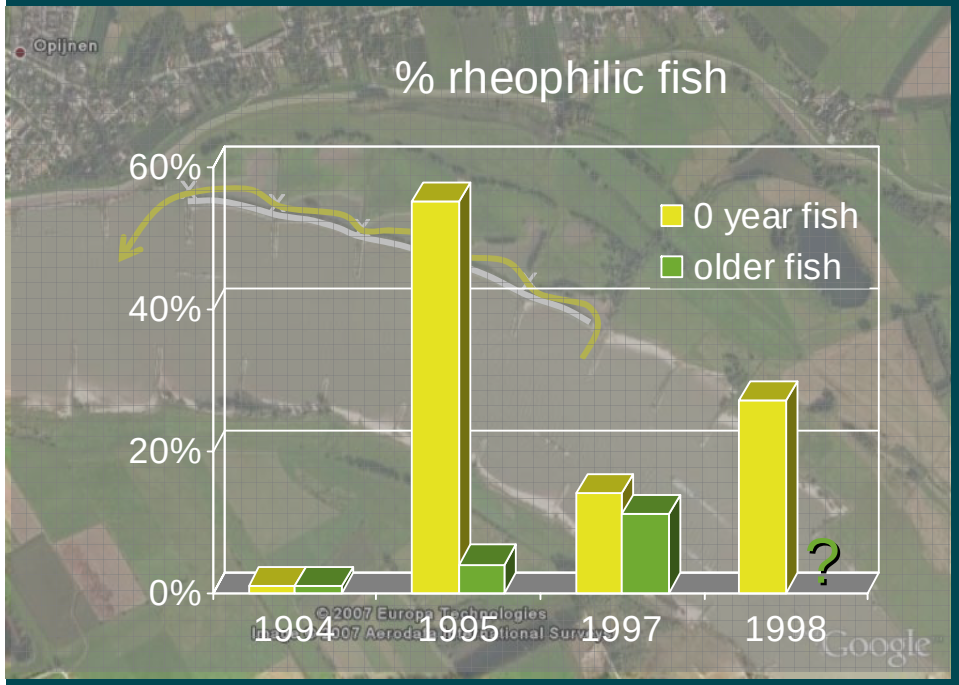
Side channel Gameren (Waal)

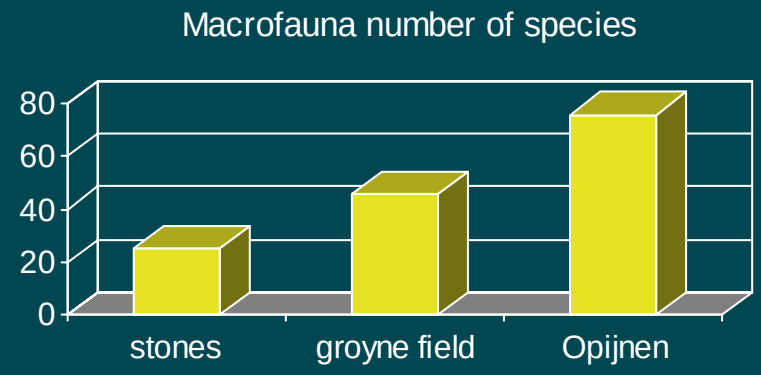




various flow conditions
various fish species

3) Small channel in groyne fields (Waal)





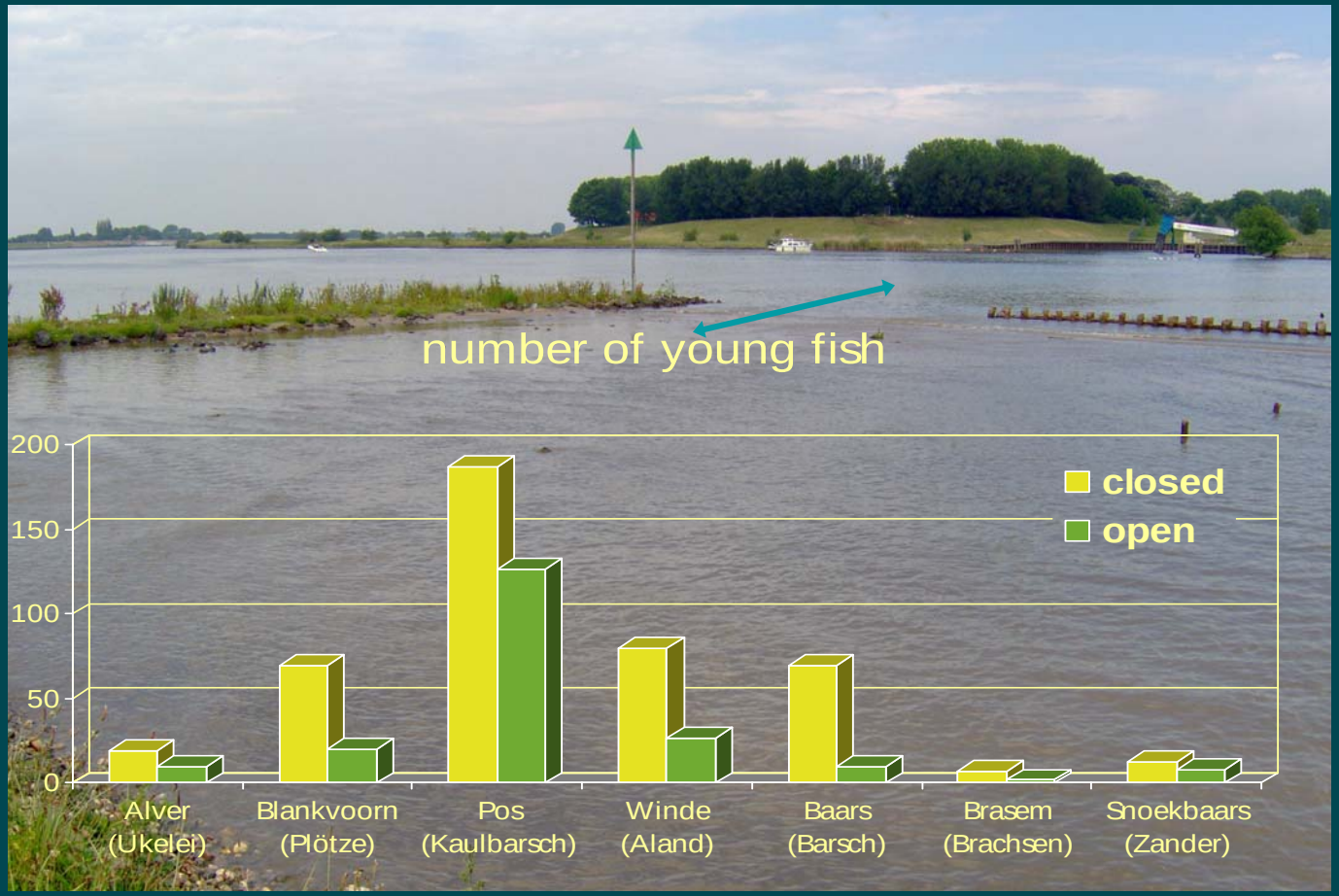
- 1% of Waal discharge
- Slow flowing water, no waves
- Lots of young rheophilic fish

4) Partial closure of groyne fields (Lek)

wiepenscherm

- Fence of piles and willows
- Less ship induced waves and currents
- Goal: more waterplants, macrofauna and fish

Partial closure of groyne fields (Lek)



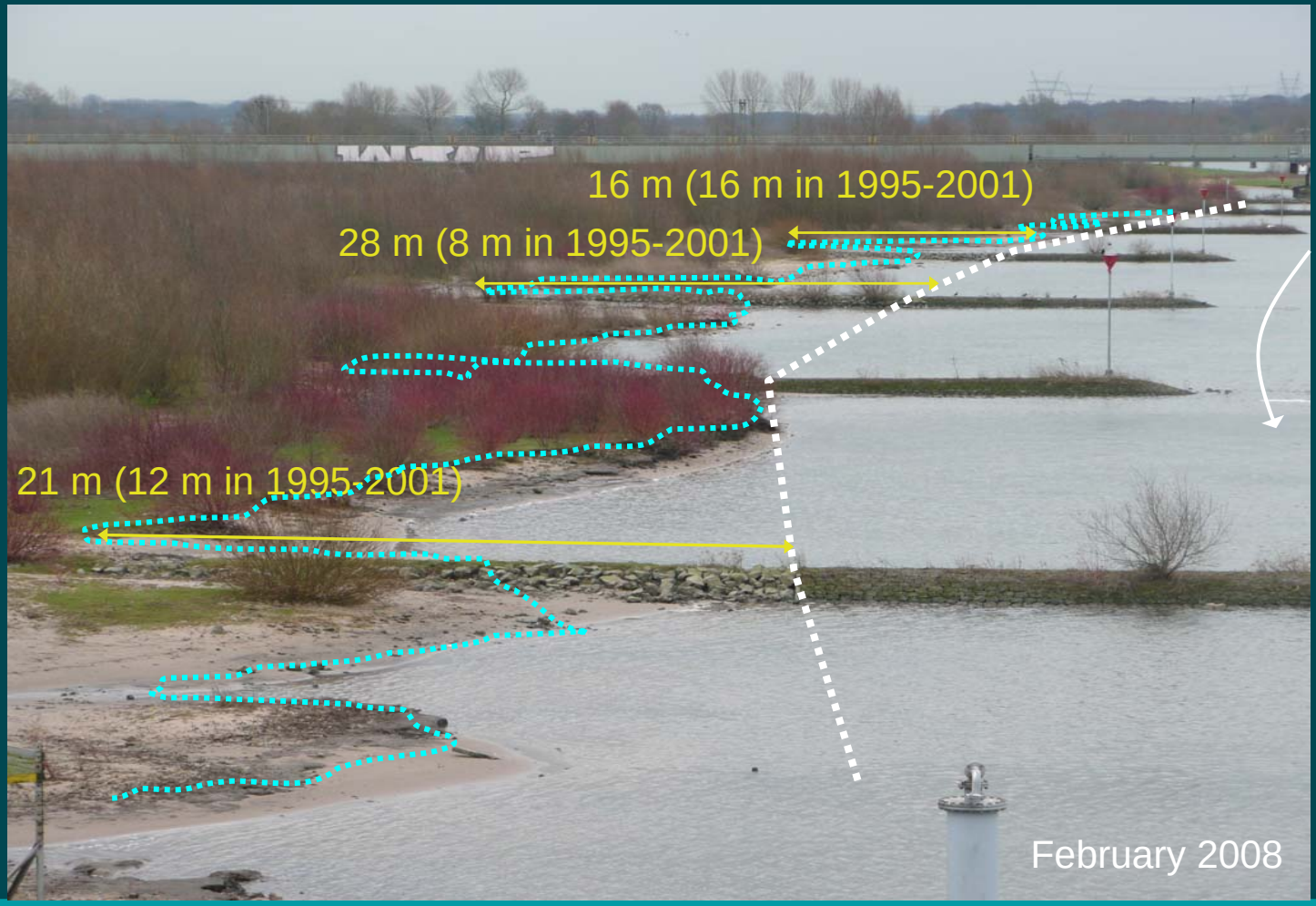
5) Removal of bank protection (right bank)
dynamic land-water gradient


IJssel Engelse werk

- Removal of rip rap, construction of new groynes
- Sandy banks, tolerated bank erosion
- No significant accretion in navigation channel

IJssel Doesburg

Engelse werk, 13 years later



Increased morphodynamics

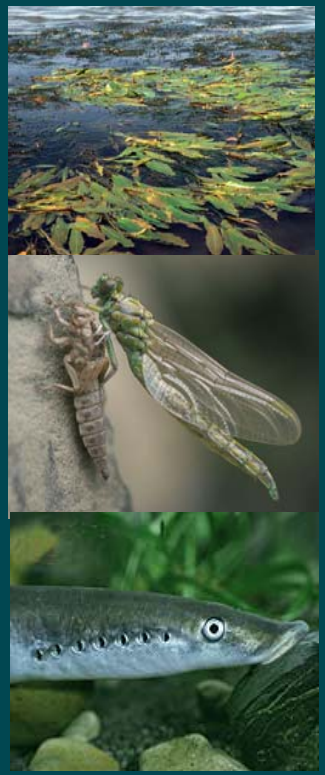
More various
macrofauna communities

Future challenges in river management

- Need for deeper and wider navigation channel due to bigger ships
- Climate change: increase of low & high discharges
- Stop river bed degradation (instability constructions)
- Improve Ecology

Idea for 35 km parallel dams, with good chances for ecology, navigation and flood protection

Conclusions:



- Small diversions of discharge cause no significant accretion in the navigation channel
- Monitoring of side channels, rip rap removal and fish passages show fortifying results
- Amount of specific riverine specific species is growing, due too creating habitats near banks and in floodplain
- It is not enough yet
- Possible win-win situation is crucial in financing
  ecology – navigation (parallel dams)
  ecology – flood protection (side channels)

Thank you for your attention!

photo: B. Boekhoven

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