Shore crabs (*Carcinus maenas*) in the Lillebælt

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KrabFisk Project

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Rationale

Shore crabs *Carcinus maenas*

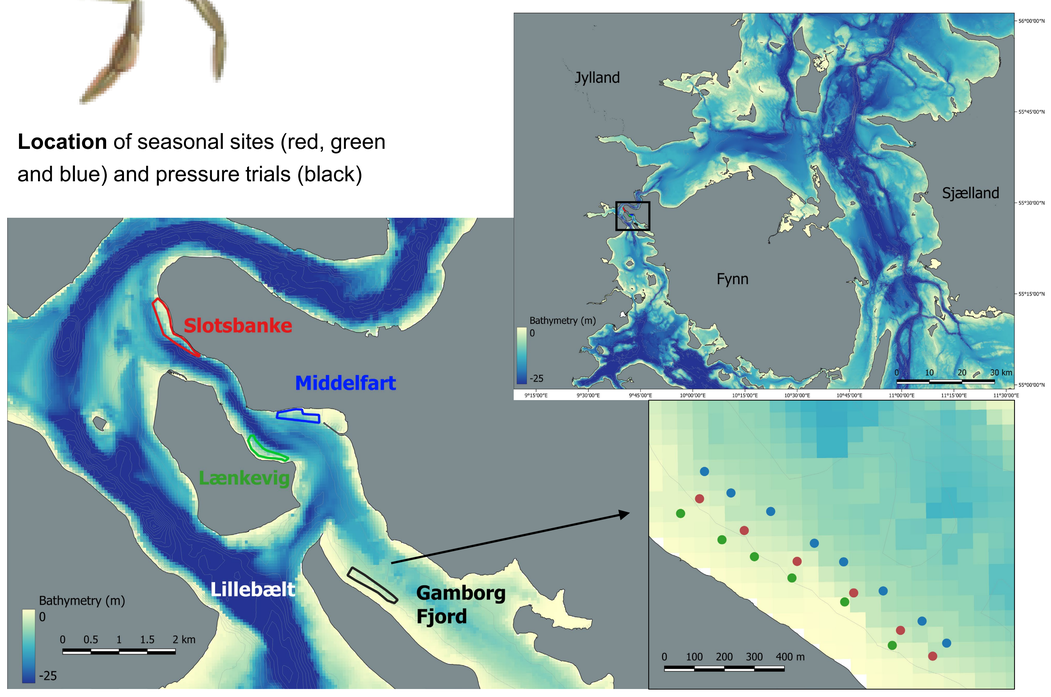
- Inhabit a wide range of coastal habitats
- High phenotypic plasticity, fecundity, environmental tolerance and omnivorous diet
- Assumed to be abundant and increasing in coastal Danish waters, but no or little data available
- Could sustain sustainable coastal fisheries

Aim

Assess in Lillebælt

- Seasonal variations in the shore crab fishing
- Small-scale resilience to fishing pressure.

Location of seasonal sites (red, green and blue) and pressure trials (black)



Approach

Seasonal survey

- 3 sites (red, blue, green)
- 18 months from May 2023
- 1 to 12 m depth
- 50 pots in 5 strings/site

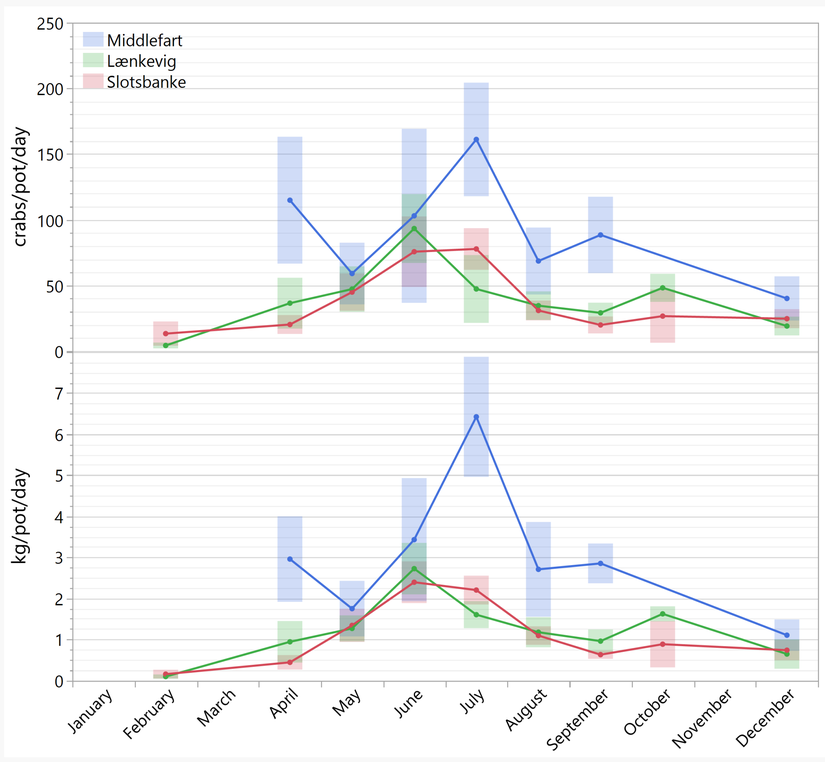
Pressure trials

- 1 site (black, 0.2 km^2),
- July and September 2024
- Two 14-day fishing trials, 6-week gap
- 200 pots in 20 strings, 1 pot every 32x32 m
- 3 rows shore to offshore, between 1 to 6 m depth

Fishing

- Baited wrasse pots fishing for 24h
- Catch per string, subsample for counts, sex, size and colour
- Temperature, eelgrass and depth
- LMM on CPUE ($\log_{x+1}$ catch/pot/day). Fixed: site/trial, day, depth/row, temperature, eelgrass, depth, Random: string nested in site/trial/row

Seasonal variations

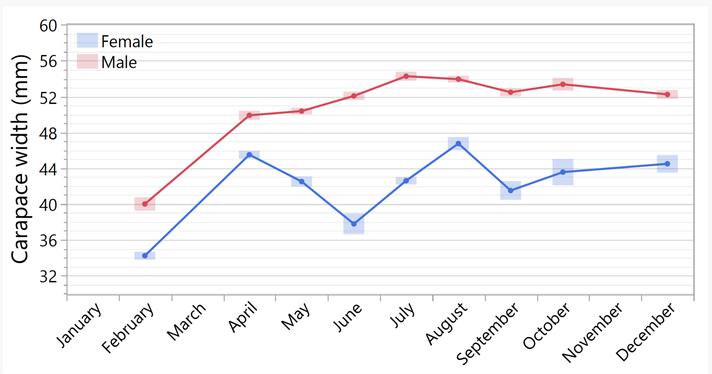


Catches

- Varied seasonally with:
  - Sites
  - Temperature
- Did not vary with:
  - Presence of eelgrass
  - Depth
- CPUE > 0.4 kg/pot/day from March to December

Carapace width

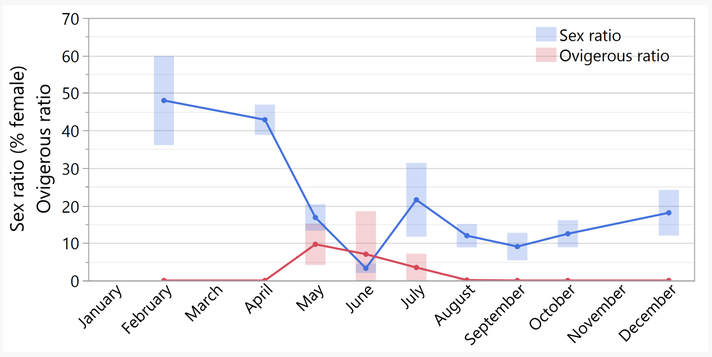
- Varied seasonally and with sites
- Both female and male crabs

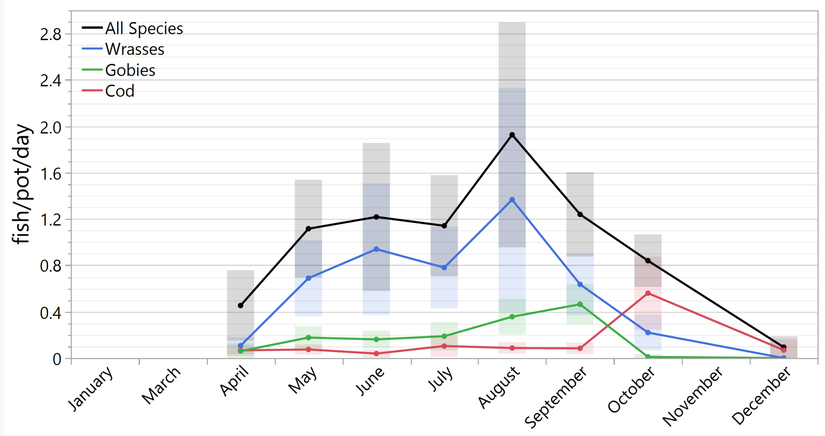


Sex ratio (% females)

Ovigerous ratio (% with eggs)

- Male dominated, usually > 80 %
- Except in winter and early spring
- Ovigerous < 10 %, likely low catchability



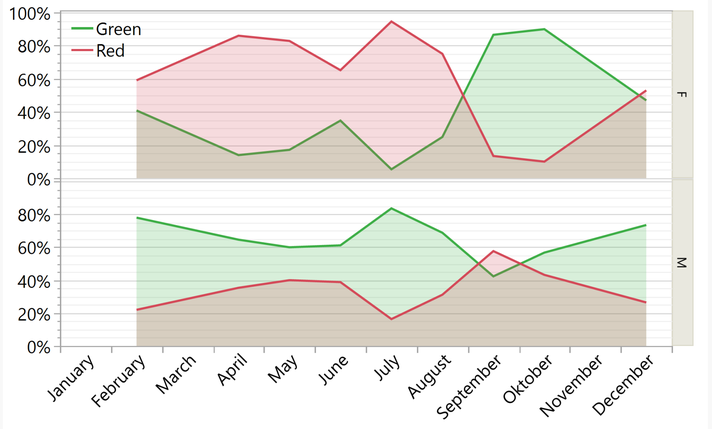


Fish bycatch

- Varied seasonally
- Did not vary with sites
- Average 1.1 fish/pot/day
- Wrasses (62%), gobies (18%), cod (10%)
- Survey used wrasse pots

Colour morphotype

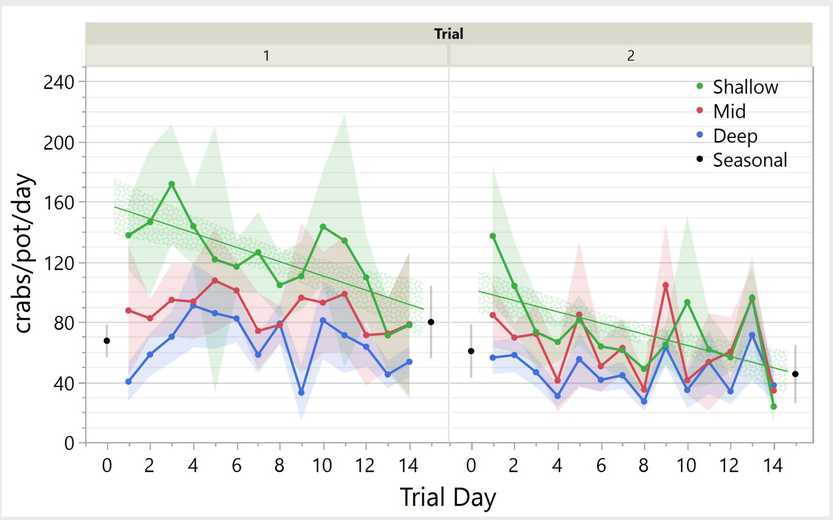
- Varied seasonally and between sexes
- Females mainly red (65%)
- Males mainly green (64%)
- Males mainly green (64%)
- Reversal in autumn in both sexes
- Reflects moulting, investment on growth (green) or reproduction (red), behaviour differences



Fishing Pressure trials

Catches

- In 14 days:
  - 7,800 / 4,840 kg
  - 250,000 / 170,000 crabs
  - 0.9 / 1.3 crabs/m^2 caught
- End T1 similar to start T2
- No decreasing trend, only in shallow row
- Similar to seasonal survey
- No changes in size or sex ratio



Conclusions

- At local scale, the shore crab population:
  - was resilient to weekly to monthly high intensity fishing
  - impact restricted to shallow areas bounded by the shore
  - recovered within a few weeks
  - higher fishing effort may have stronger impacts
- Spatially and seasonally variable catches
- 34-week fishing season March to November at 1.4 kg/pot/day
- One fisher could catch 65 to 80 tonnes/season using 300 pots
- Fish bycatch of ca. 57,000 fish, of which ca. 5,700 would be small cod
- Expansion of the current small shore crab Lillebælt fishery is not limited by shore crab abundance but by market demand and low value

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