

Achievability of the ASCOBANS Conservation Objectives:

- Simulation Results -

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ASCOBANS Conservation Objectives

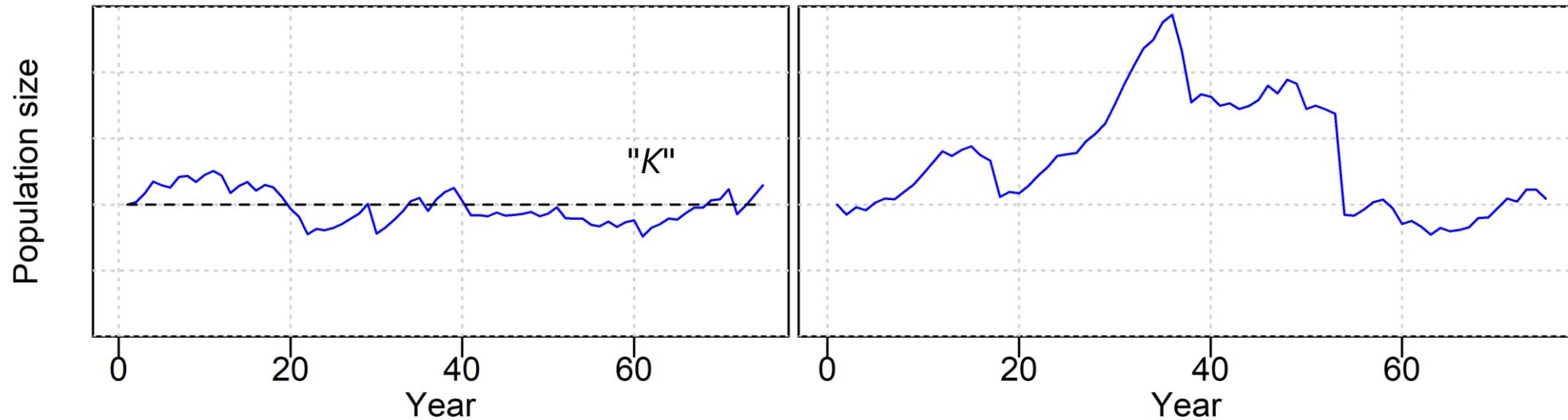
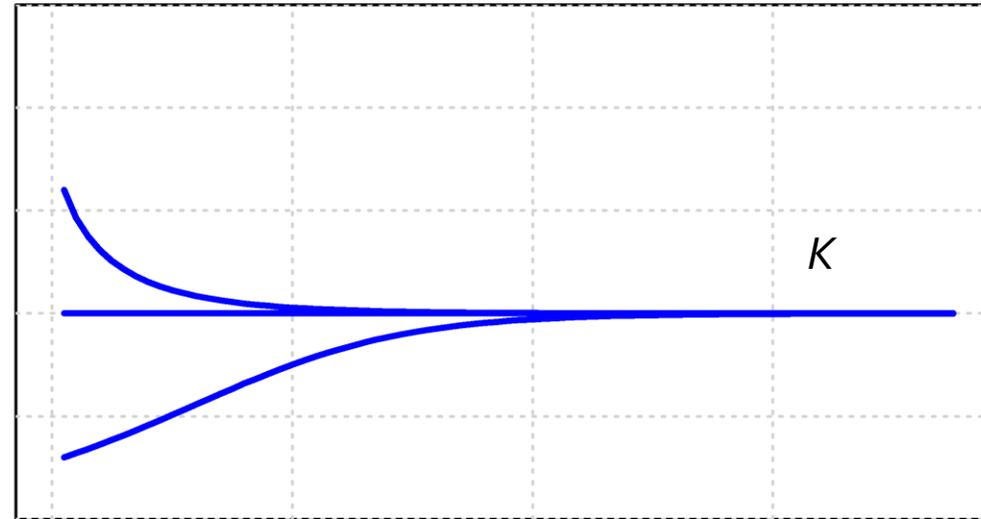


Carrying Capacity

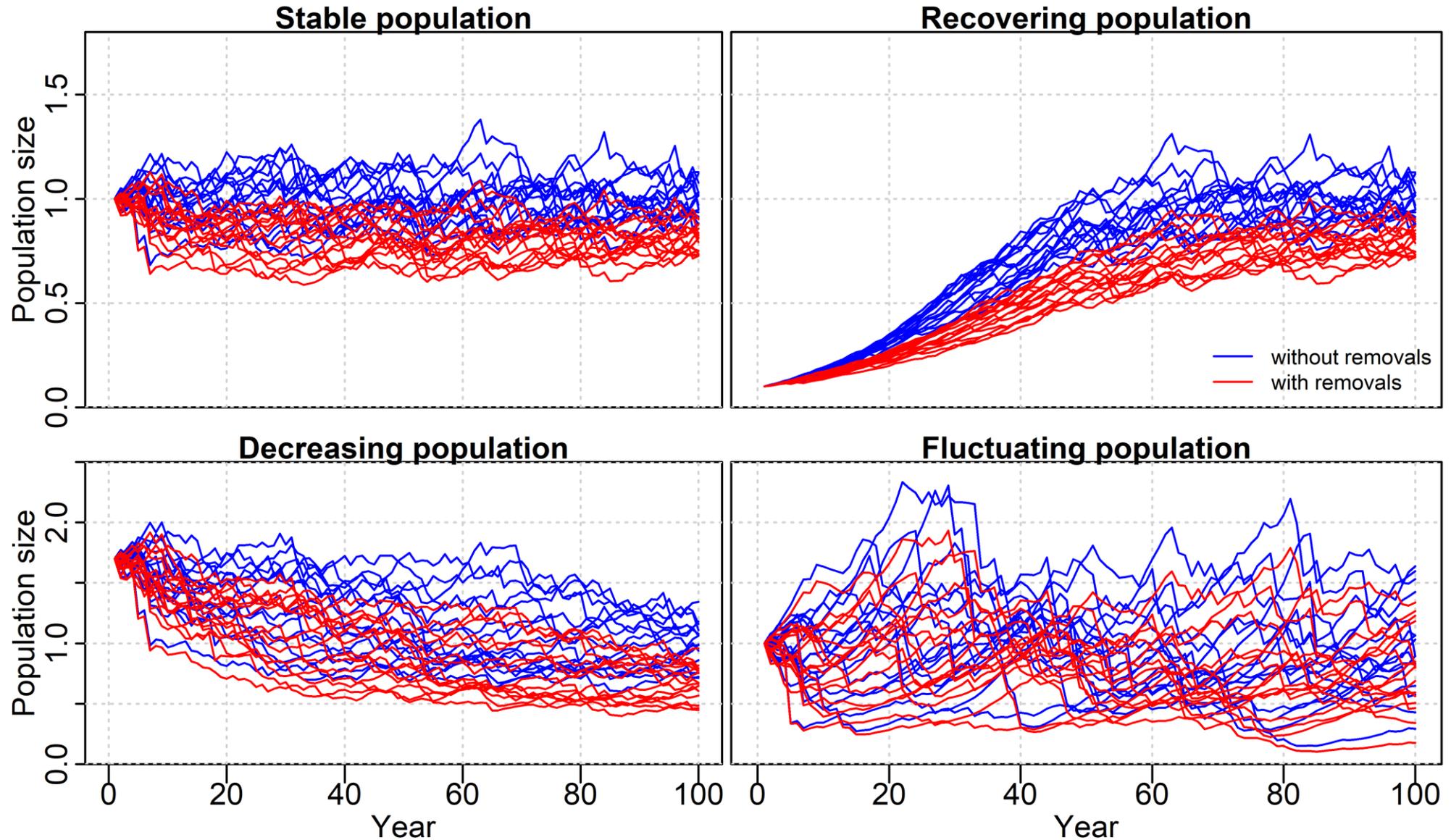
- Definition: Carrying capacity (K) as the level that a population would reach in the absence of anthropogenic removals (such as bycatch, hunting, vessel strikes, fatal entanglements and other direct kills) and in the absence of anthropogenic effects that negatively impact reproduction such as disturbance, toxic pollutants, habitat destruction and competition for prey.
- The value of K is constantly affected by natural environmental variation and is difficult to determine directly. The range and carrying capacity of most populations are expected to change, anyway, over time.
- Approaches therefore to achieving the $0.8K$ target do not involve specifying a fixed value for K , but instead aim to ensure that anthropogenic removals are low enough that the population can be expected, under reasonable assumptions, to recover towards, or remain above, the $0.8K$ level.

Carrying Capacity definitions

- Static : assumed to be constant
- Dynamic : K defined by
- no-removal scenario



Comparison of populations with/without bycatch



Achievement of ASCOBANS conservation objective (0.8K)

Unfinished business from the CO Workshops

- Time horizon for achievement: 20-100 years
- "Probability" of achievement: 80-95%
- Recovery Factor for PBR (F_R)
(e.g. OSPAR recommendation 0.1 – 0.35)

Note: Determination of whether CO is satisfied involves a comparison of two distributions :

- 95% achievement probability means lower 5%-ile of population with bycatch is at least 0.8 times the lower 5%-ile of the population
- 80% achievement probability means lower 20%-ile of population with bycatch is at least 0.8 times the lower 20%-ile of the population

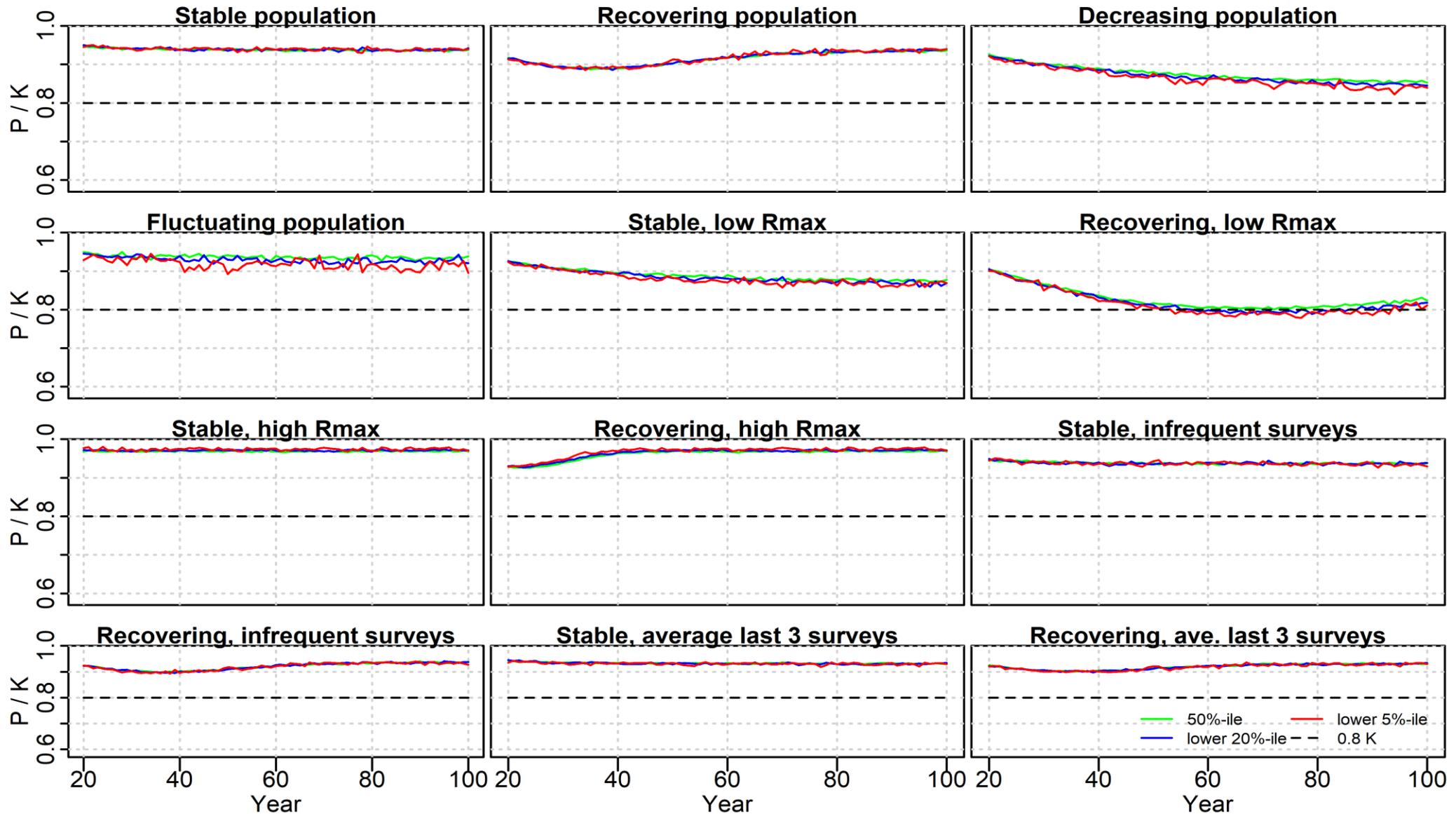
Simulation testing of removal limit formulae/rules (e.g. PBR, RLA)

- hypothetical populations from which hypothetical data generated
- “we” know the true population status
- rule being tested knows only the data
- can compare population with/without bycatch over a variety of plausible scenarios

Test scenarios constructed using combinations of the following factors:

- **Population dynamics:**
 - Population trend without bycatch: stable / increasing / decreasing / chaotic
 - Productivity: high ($R_{max} = 0.08$) / medium ($R_{max} = 0.04$) / low ($R_{max} = 0.02$)
- **Data collection and use:**
 - Survey frequency: high (every 5 yr) / low (every 10 yr)
 - Precision of estimates: high ($CV = 0.15$) / low ($CV = 0.30$)
 - Biassed/unbiassed
 - Use only latest estimate / take average of last 3 estimates
- **Management options**
 - For PBR, different values of the Recovery Factor (F_R)

Simulations of ratio P/K for PBR with RF = 0.35 (OSPAR recommended value)
 (1000 replicates per scenario)



Conclusions

- OSPAR recommended maximum Recovery Factor of 0.35 satisfies 0.8K CO in all scenarios considered to date
- Choice of probability level (in range 50-95%) makes virtually no difference to results
- Achievement of the CO throughout the time window 20-100 years is feasible (and is a stronger criterion than one based on a single time point)