Supplementary online appendix to

Size-selective fishing gear and life history evolution

in the Northeast Arctic cod

Christian Jørgensen, Bruno Ernande, and Øyvind Fiksen
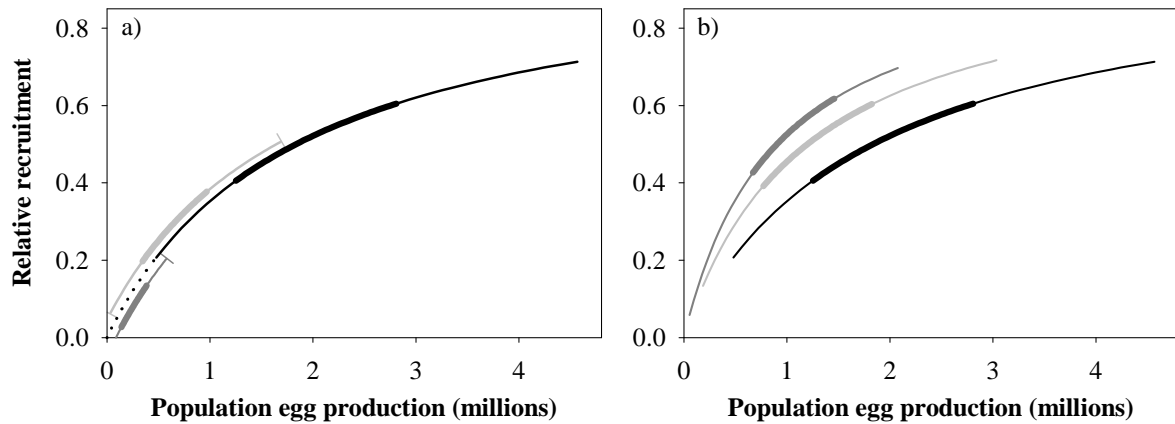
Contents:

Figure A1. Beverton-Holt stock recruitment curves used in two scenarios to calculate long-term fisheries yield at evolutionary equilibrium when cod life histories evolve in response to size-selective fishing gear. a) In the first scenario we assume that the stock recruitment curve remains constant. The black curve shows the range of total egg production and corresponding recruitment for the stock prior to harvest, with the thin line representing the 90% range and the thick line the 50% range. The dotted line is the continuation of this curve to the origin. After harvesting and resulting life history evolution, the stock produces fewer eggs annually and recruitment is correspondingly lower (the lines are displaced slightly to improve readability; light grey lines harvest rate 0.1 year^{-1} in both the feeder and spawner fishery; dark grey lines harvest rate 0.3 year^{-1}; all fish were harvested with equal probability regardless of size as in Fig. 3a of the main manuscript). b) In the second scenario we rescaled the steepness of the Beverton-Holt curves so that a population with lower egg production produces the same number of recruits on average also after life histories have evolve (shading corresponds to harvest rates as in panel a).
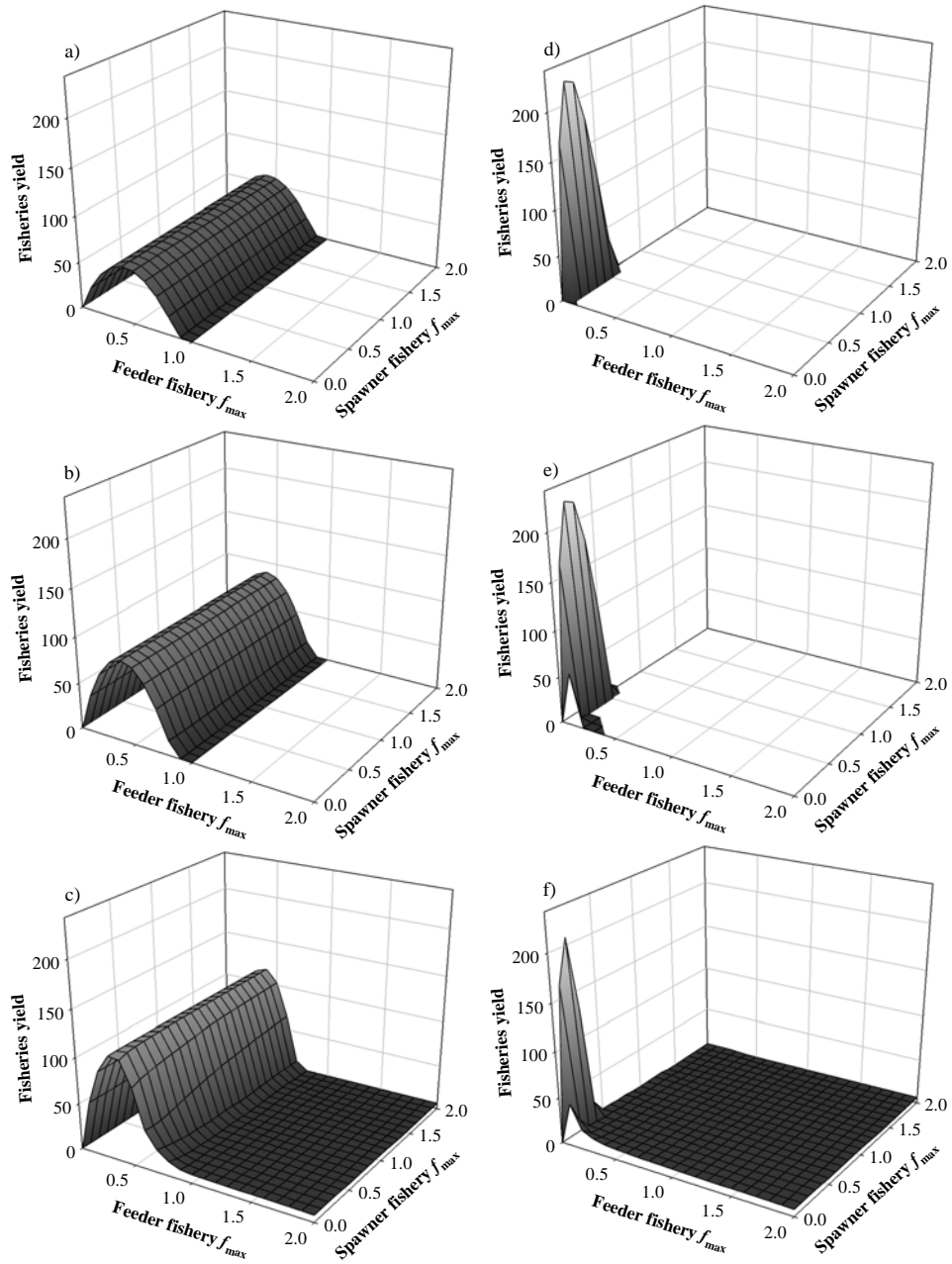
Figure A2. Long-term equilibrium yield for the optimal life history strategies under different harvest levels when the Beverton-Holt total egg production-recruitment curve is assumed to remain constant with the parameters as in the pre-harvest situation. Bell-shaped size-selectivity: a) L_{max} = 70 cm; b) L_{max} = 90 cm; c) L_{max} = 110 cm. Sigmoid size-selectivity: d) L_{max} = 70 cm; e) L_{max} = 90 cm; f) L_{max} = 110 cm. For further explanation of axes see Fig. 3 in the main article.
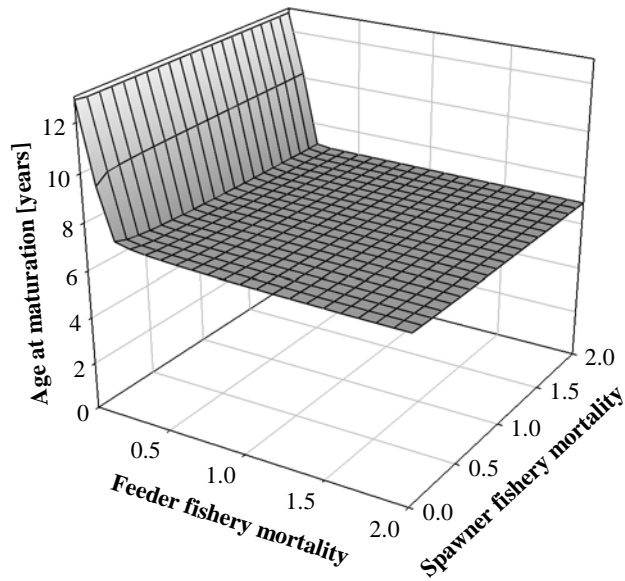
Figure A3. Optimal age at maturation in when gear selectivity reflects the gear types used in the fishery for Northeast Arctic cod, that is trawling with sigmoid size-selectivity at the feeding grounds and gillnets and longline with bell-shaped selectivity curves at the spawning grounds. For both gear types we used $L_{max} = 90$ cm. The axes are further explained in the legend to Fig. 3