Oikos

OIK-04702

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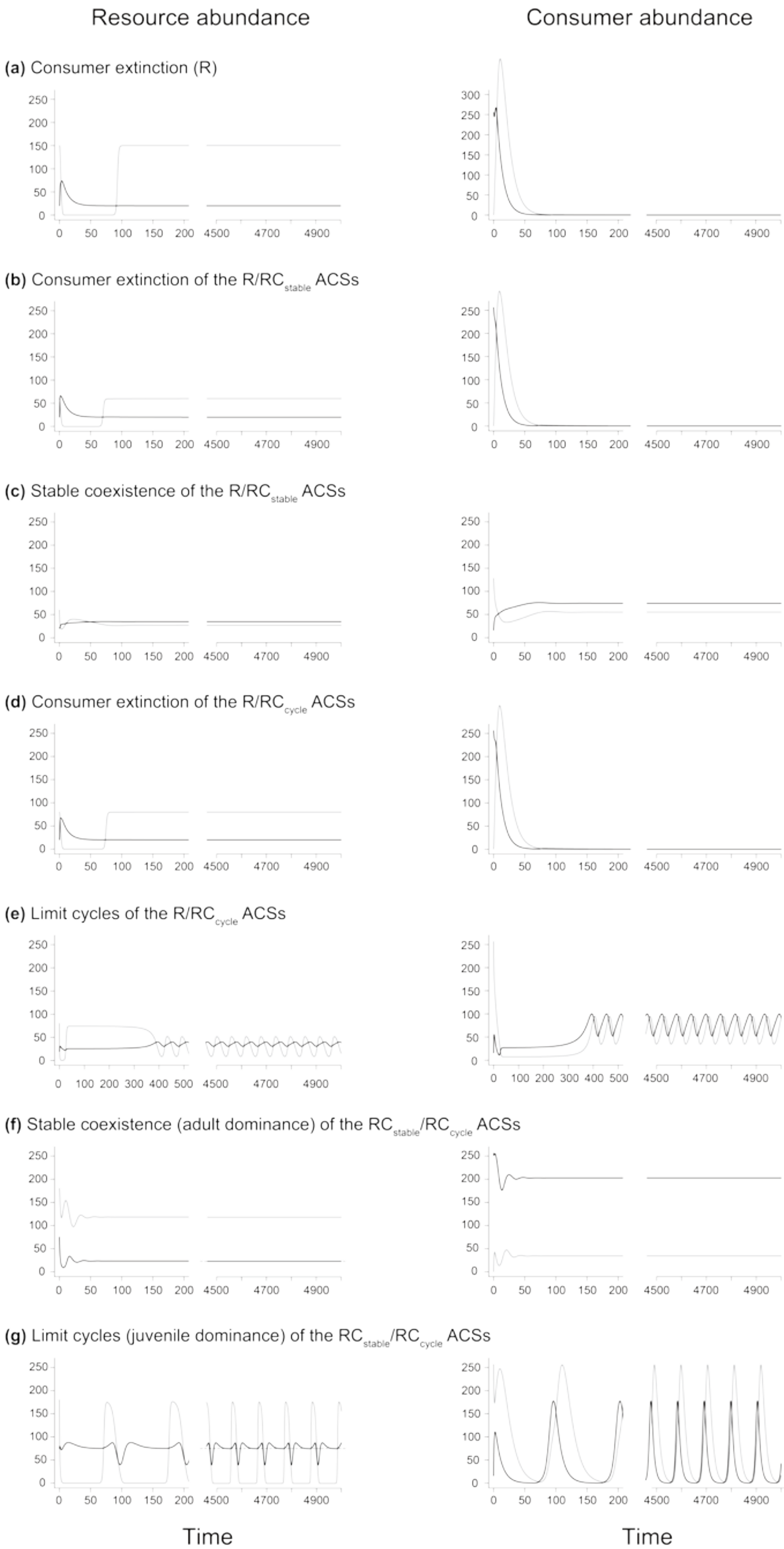
Appendix 1

Steady-state community dynamics

Here, we present numerical examples of steady-state community dynamics of the present module model. The left and right panels show resource and consumer abundances, respectively. The grey and black solid lines represent juvenile and adult variables, respectively. The dynamics exhibit (a) inevitable consumer extinction (the label R in Fig. 2), (b, c) the ACSs of consumer extinction and convergence to the coexistence equilibrium (R/RC_{stable}), (d, e) the ACS of consumer extinction and limit cycles (R/RC_{cycle}), and (f, g) the ACS of convergence to the coexistence equilibrium and limit cycles (RC_{stable}/RC_{cycle}). Stage-specific carrying capacities are (K_J, K_A) = (a) (150, 20), (b, c) (60, 20), (d, e) (80, 20), and (f, g) (180, 75). Initial conditions are $R_i(0) = K_i$ and (C_J, C_A) = (a, b, d, f) (0.5, 256), (c) (128, 16), and (e, g) (256, 16). The dashed lines in left panels of (f, g) represent the long-term average of the adult resource abundance, which is greater and less than the carrying capacity of the adult resource $K_A = 75$ in panels (f) and (g), respectively. Panels (f, g) occur only when mutualism is nonlinear, for which $\beta = 0.5$ is used. Other parameters are the same as in Fig, 2a.

Figure A1

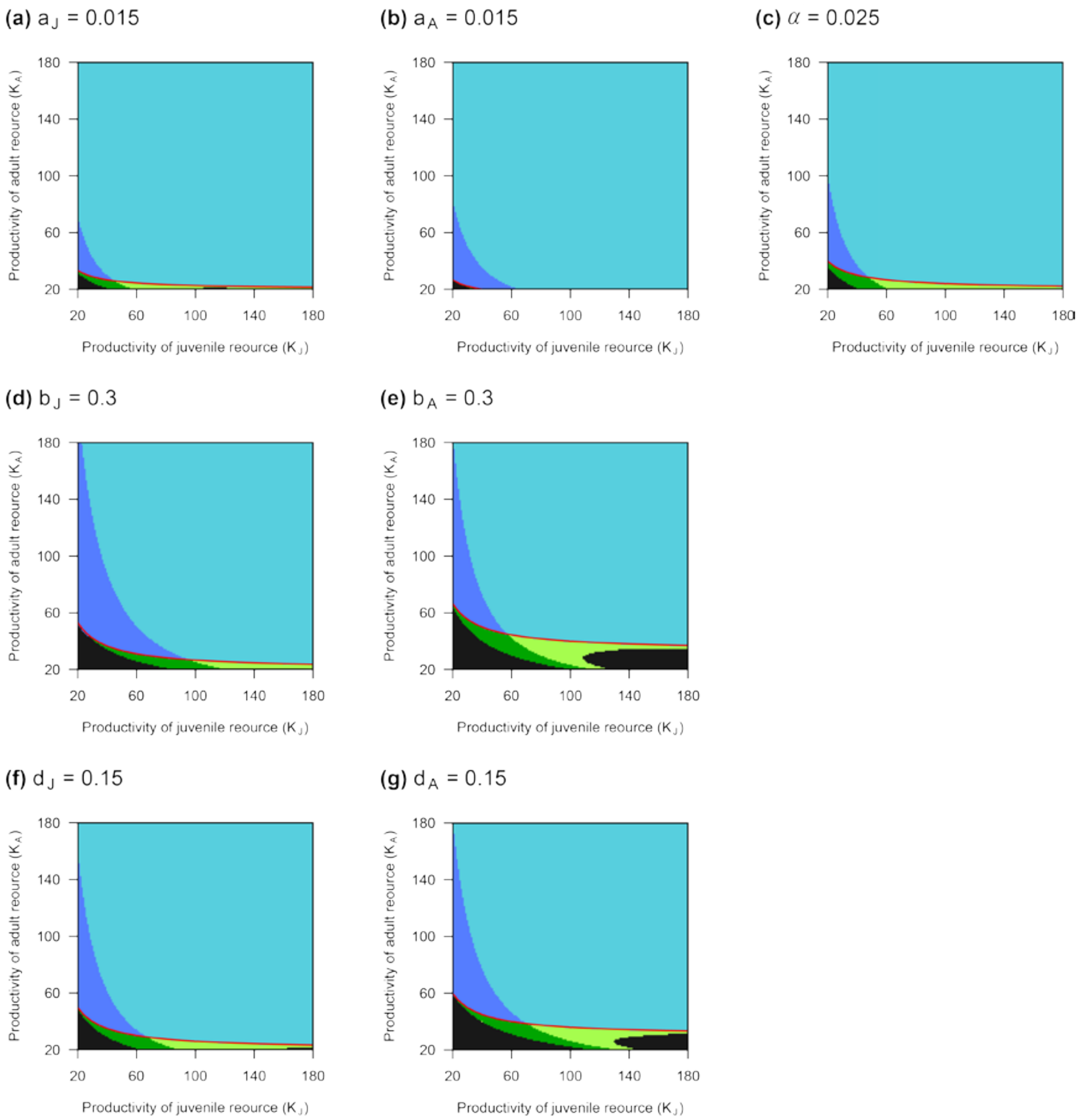

Resource abundance
Consumer abundance
(a) Consumer extinction (R)
(b) Consumer extinction of the R/RC_{stable} ACSs
(c) Stable coexistence of the R/RC_{stable} ACSs
(d) Consumer extinction of the R/RC_{cycle} ACSs
(e) Limit cycles of the R/RC_{cycle} ACSs
(f) Stable coexistence (adult dominance) of the RC_{stable}/RC_{cycle} ACSs
(g) Limit cycles (juvenile dominance) of the RC_{stable}/RC_{cycle} ACSs
Time
Time

Appendix 2

Parameter sensitivity

Here, we present the steady-state community structure for both linear and nonlinear interactions at various parameter settings. Both resource exploitation and mutualism are linear (h_i = 0 and β = 0) in Fig. A2. Only resource exploitation is nonlinear (h_i = 0.5 and β = 0) in Fig. A3. Only mutualism is nonlinear (h_i = 0 and β = 0.5) in Fig. A4. Both are nonlinear (h_i = 0.5 and β = 0.5) in Fig. A5. In each figure, one parameter value is manipulated as follows: (a) a_J = 0.015, (b) a_A = 0.015, (c) α = 0.025, (d) b_J = 0.3, (e) b_A = 0.3, (f) d_J = 0.15, and (g) d_A = 0.15. Notations and other parameter conditions are the same as in Fig. 2.

Figure A2



(a) a J = 0.015
(b) a A = 0.015
(c) α = 0.025
(d) b J = 0.3
(e) b A = 0.3
(f) d J = 0.15
(g) d A = 0.15
Productivity of adult reource (K A)
Productivity of juvenile reource (K J)
20
60
100
140
180

Figure A3

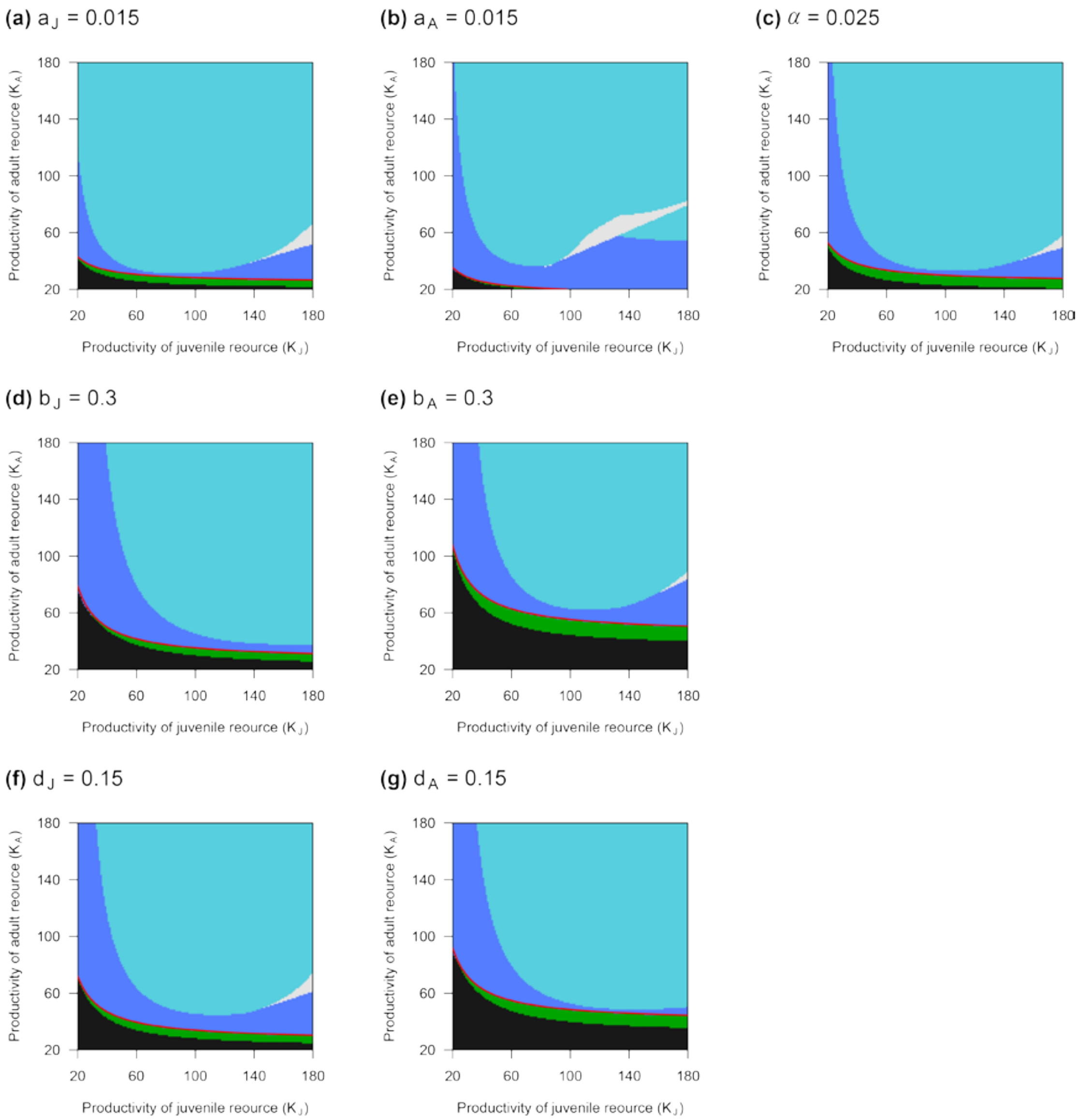

(a) a_J = 0.015
(b) a_A = 0.015
(c) α = 0.025
(d) b_J = 0.3
(e) b_A = 0.3
(f) d_J = 0.15
(g) d_A = 0.15
Productivity of adult reource (K_A)
Productivity of juvenile reource (K_J)
180
140
100
60
20
20
60
100
140
180

Figure A4

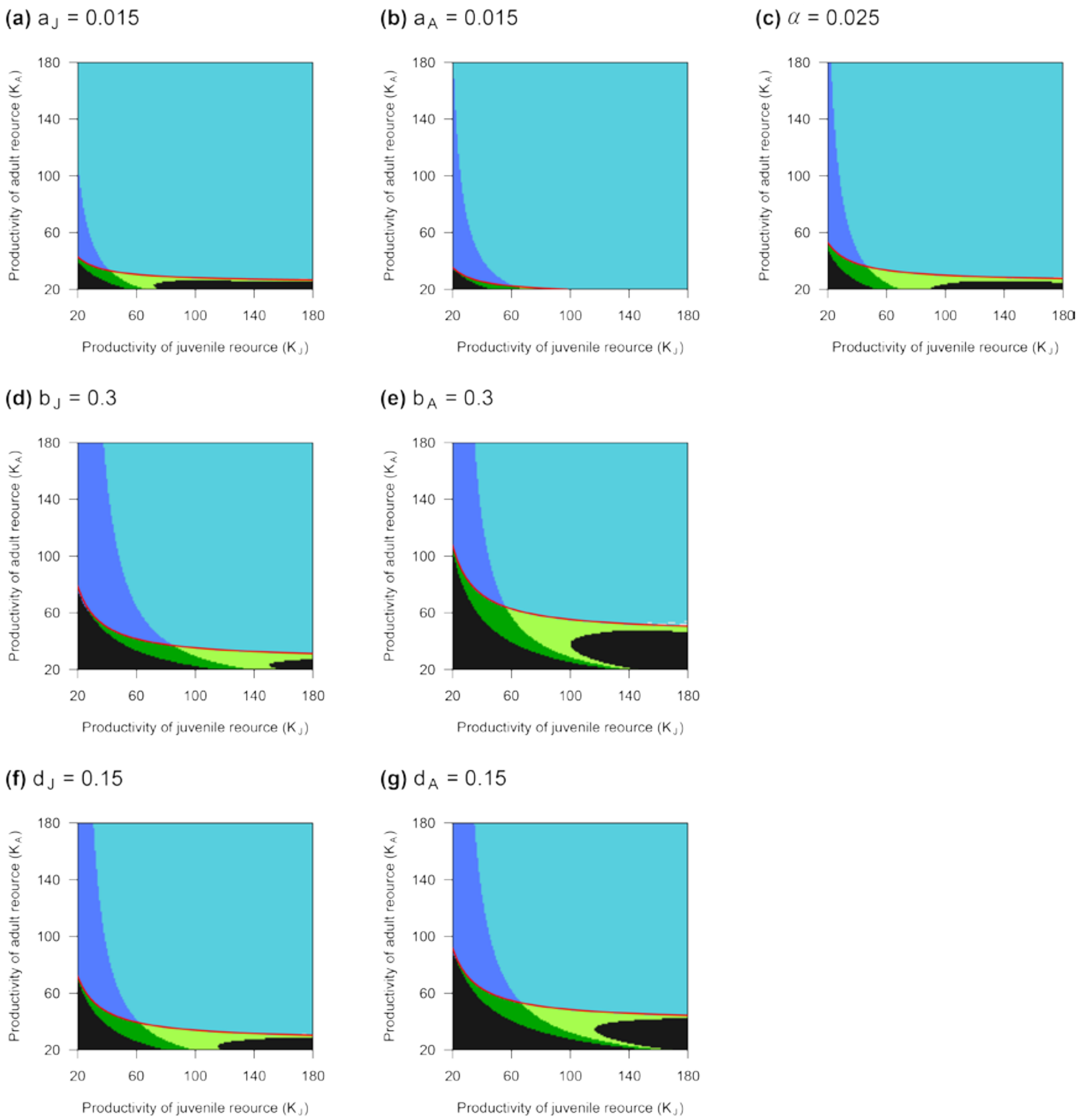
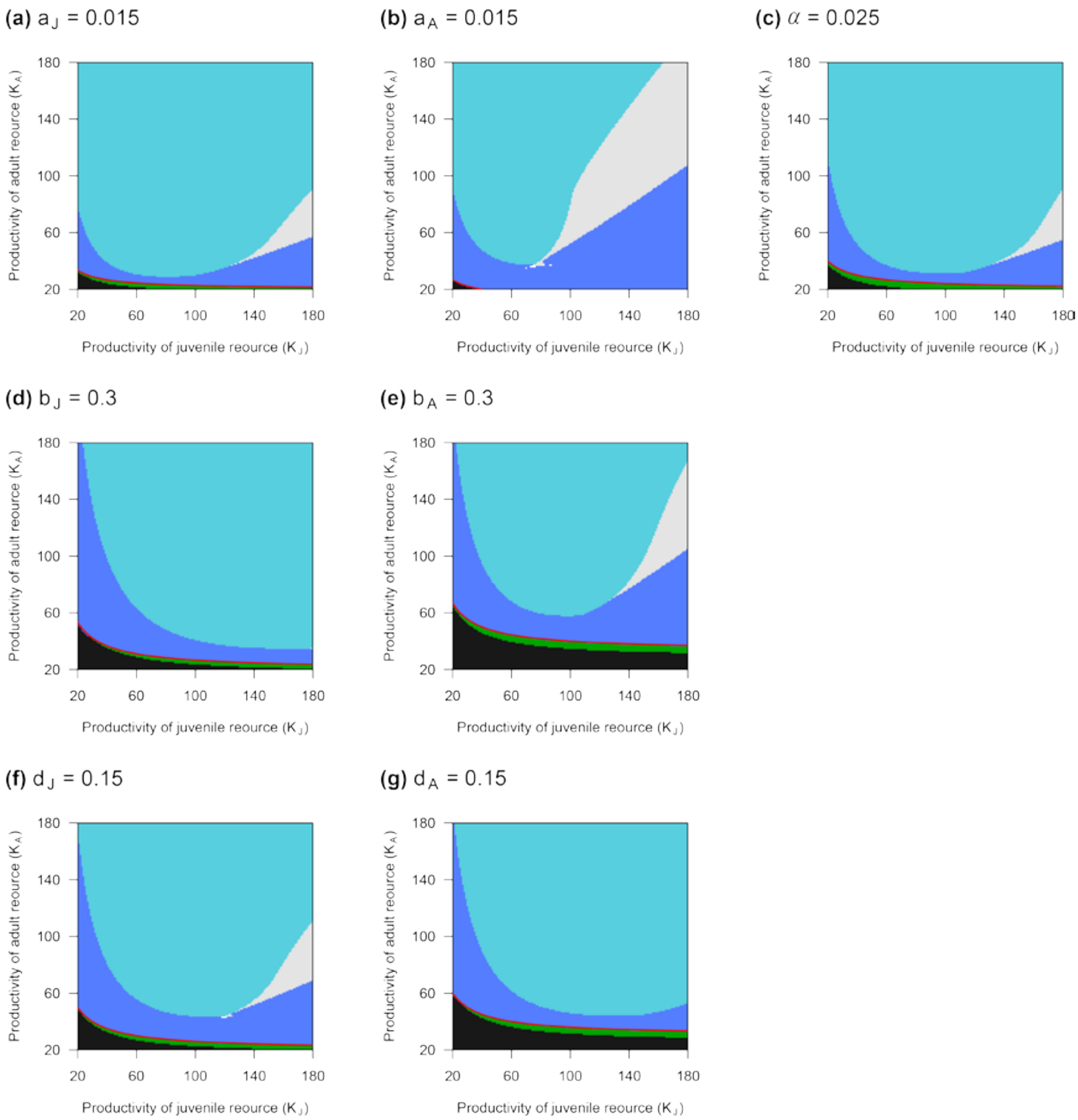

(a) a J = 0.015
(b) a A = 0.015
(c) α = 0.025
(d) b J = 0.3
(e) b A = 0.3
(f) d J = 0.15
(g) d A = 0.15
Productivity of adult reource (K A)
Productivity of juvenile reource (K J)
180
140
100
60
20
20
60
100
140
180

Figure A5


(a) a J = 0.015
(b) a A = 0.015
(c) α = 0.025
(d) b J = 0.3
(e) b A = 0.3
(f) d J = 0.15
(g) d A = 0.15
Productivity of adult reource (K A)
Productivity of juvenile reource (K J)
20
60
100
140
180